Head of moderate width, its front margin smoothly curved in a dorsal view. The head is abruptly contracted in width below the eyes and is without any trace of lobes, though a thickened area extends down from below the eye, lying upon and closely appressed to the socket of the second antennae. The anterior margin of this extension is somewhat notched and it ends in a prominent tubercle below and external to the antennal socket. No tubercle between the first antennae; the median area between them is smooth. Eyes rather large, oval, with twenty-five or more well-developed ocelli in four rows. The second antennae are broken off in all the specimens.

A detached antenna probably, but not certainly, belonging to a specimen of

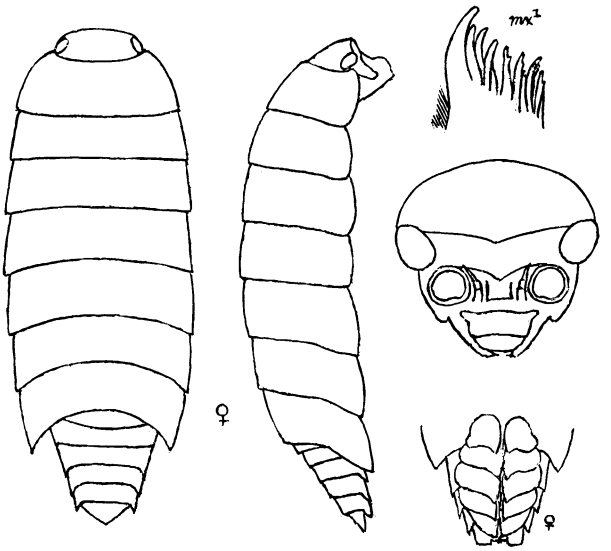

Fig. 72. *Philoscia roraimae*, new species.

this species is rather long and slender, especially the last segment of the peduncle. The flagellum is only slightly shorter than this segment, not including the long terminal bristle that the flagellum bears. The terminal article of the flagellum is somewhat the longest, exclusive of the bristle; the second is slightly shorter than the first.

The three anterior thoracic segments have the rear border slightly sinuous and the rear angle, which is very slightly less than a right angle, somewhat rounded off. The fourth segment has it rectangular and slightly rounded and the last three segments have it acute and extended backward.

The legs are strongly developed, indicating an animal of quite active habits. They are provided with strong, sharp spines and increase greatly in length toward the rear of the body. Sexual difference in the spines were not observed.

The rear angles of the third, fourth, and fifth abdominal segments are extended back in rather small triangular points. The telson is broadly triangular with practically straight sides and is not rounded off at the apex.

The basal segments of the uropoda extend slightly beyond the tip of the telson. The internal branch is quite long, laterally compressed and gradually tapered in a side view. The external branches were broken off in all the specimens.

The coloration is handsome, the polished body surface, dark brown ground color and light yellowish spots giving a tortoise shell effect. Besides the usual irregular bars on the lateral region of the back, there is a row of small median spots, a row on each side of quite large squarish spots at the base of the epimera, and usually also light spots on the epimera. The abdominal segments have three light spots, median and lateral. There is considerable brown pigment below on the legs, pleopods, etc.

The largest specimens, females, would be about 10 mm. long if straightened out.

LOCALITY.—Mt. Roraima (Venezuelan side). A dozen specimens, all females but one, were obtained by Mr. G. H. H. Tate at Rondon Camp at an altitude of 6900 feet, southwest of the plateau, about one-quarter of a mile from the base of the cliffs. The specimens, including the type (Cat. No. 6506) are in The American Museum of Natural History.

Two very small specimens in a soft condition, due apparently to recent moulting, obtained on Mt. Duida, Venezuela, at an altitude of 4800 feet by Mr. Tate, are perhaps also to be assigned to this species.

Philoscia seriepunctata Budde-Lund, 1893

Philoscia seriepunctata BUDDE-LUND, 1893, p. 122 (orig. descr.).—DOLLFUS, 1893*a*, p. 345.

"Oblonge ovalis, convexiuscula, nitida, laevis, in margine posteriore trunci segmentorum series transversa punctorum minutissimorum.

"Linea frontalis marginalis nulla; epistoma vix transverse lineatum, infra inter antennulas tumidum.

"Trunci segmenta tria priora margine posteriore curvato.

"Epimera caudae segmentorum adpressa, segmentum anale triangulum, lateribus subrectis.

"Color flavo-brunneus.

"Long. 3 mm." (Budde-Lund, 1893.)

LOCALITY.—Caracas, Venezuela, one mutilated specimen (Budde-Lund).

Philoscia inquilina, new species

Figure 73

The body is moderately elongate, the integument firm, considering the small size of the species, smooth and glossy, and bearing scattered, short, stiff hairs which are more conspicuous on the antennae and uropoda.

The head is moderately wide and when seen from above is only slightly convex in front, and is without lateral lobes. It is considerably contracted in width just below the eyes, which are quite large, almond-shaped, and with about fourteen or

fifteen ocelli, rather poorly pigmented. No tubercle between the first antennae. Second antennae setose, over two-thirds as long as the body; their flagellum, excluding the rather long terminal bristle, is about three-fourths the length of the fifth joint of the peduncle and has the first article the longest and the middle one the shortest.

The lateral ends of the thoracic segments have decidedly curved outlines and the rear lateral angles of all seven segments are noticeably rounded off and, beginning

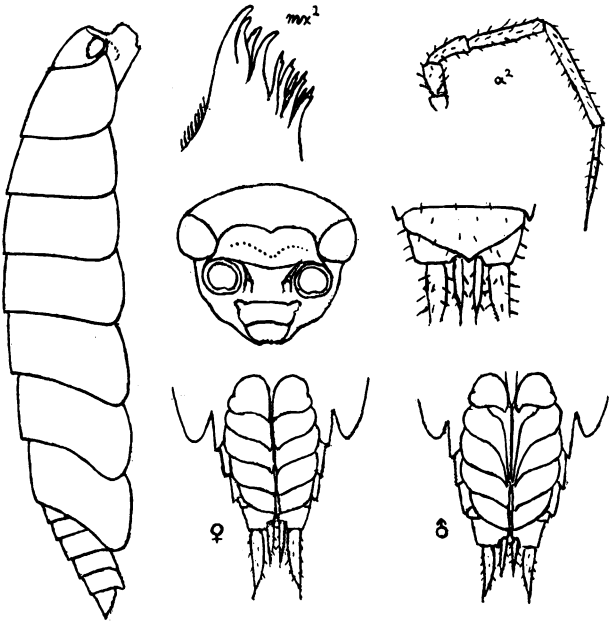

Fig. 73. *Philoscia inquilina*, new species.

with a slight extension in the third, are extended back to an increasing extent. Sexual differences in the legs were not observed.

The abdomen is fairly long and not greatly tapered in width. The abdominal segments three to five inclusive have their rear lateral angles produced into small, appressed, backwardly directed points which are not especially acute. The telson is almost parallel-sided for a short distance in its anterior part; the main portion is quite broadly triangular with nearly straight, very slightly sinuous, converging sides and an acute tip with a slight suggestion of acumination. The basal joints of the uropoda reach as far as the tip of the telson, or extend beyond it. Their exopodites are setose, strongly tapering, tipped with a stout bristle, and have a noticeable outward curvature. They appear to average a little longer in the females than in the males.

The coloration is of the usual pattern, but in many of the specimens the light areas are more extensive in proportion to the brown ground color than is usually the case. On the epimera the pigment often shades off gradually, leaving their greater part light-colored, while the bars and spots on the lateral regions of the back often become confluent, forming large, irregular light areas that give the body, when seen without much magnification, an appearance of being crossed by imperfect but noticeable transverse bands. There is a dark band across the front of the head between the eyes.

Length of largest specimen, a female, a little over 6 mm.

LOCALITY.—Bartica, British Guiana. Fourteen specimens, including the type (Cat. No. 6507) and comprising both male and female examples, were collected by Mr. Herbert Lang in October, 1922, and are in the American Museum of Natural History. His notes state that they were found in an underground ants' nest. A small specimen which he obtained at Kamakusa appears to be of this species also.

The coloration is rather more vivid than would be expected in a species of subterranean habits, but the large though imperfectly pigmented eyes may be an incipient adaptation to such a life. The noticeably rounded posterior lateral angles of all the thoracic epimera furnish an easy means of recognizing this species.

Philoscia richmondi Richardson, 1901

Figure 74

Philoscia richmondi RICHARDSON, 1901, p. 564 (orig. descr.), Figs. 32, 33; 1905, p. 603 (descr.), Figs. 658, 659.

Body rather narrow and elongate, the surface smooth, practically without pubescence except for a few scattered hairs.

The head when seen from above is gently convex in front; when tilted up it is somewhat sinuous, with scarcely a vestige of lateral lobes. The line marking the upper border of the epistome is not very definite and only moderately arched in a front view. Eyes oval, moderately large, placed rather low.

Second antennae rather long, about two-thirds the length of the body. The three-jointed flagellum slightly exceeds the terminal segment of the peduncle, exclusive of a long spine with which it is tipped in the present species. The first of the articles of the flagellum, excluding the terminal spine, is somewhat the longest of the three, the middle one is the shortest.

The lateral ends of the thoracic segments, especially toward the rear end of the thorax, are cut off in a decidedly curved outline. The first four segments have the rear lateral angles conspicuously rounded off,

and those of the remaining three thoracic segments are not actually acute. The fourth very slightly, and succeeding ones to an increasing extent, have these angles produced backward.

No sexual differences were noted in the legs, which are rather long and stout.

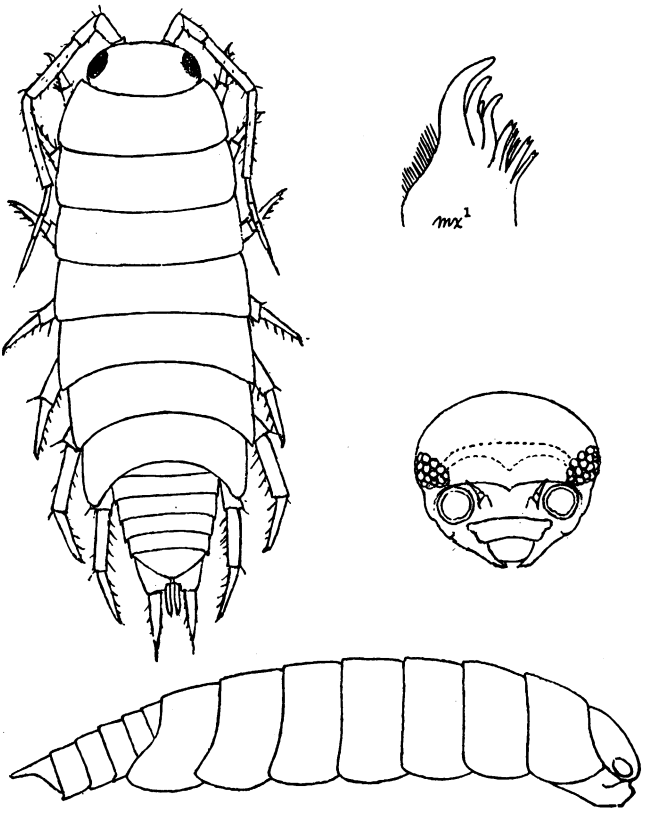

Fig. 74. *Philoscia richmondi* Richardson.

The third, fourth, and fifth abdominal segments have the rear angles only slightly produced back, forming only extremely small, short triangular points. The telson is triangular with slightly convex sides and is only rounded off at the apex.

Coloration often quite bright and conspicuous. Ground color of upper parts deep brownish purple with narrow but conspicuous light (unpigmented) borders to the segments and irregular elongate bars and

spots on the lateral regions of the back. A considerable area on the basal part of the thoracic epimera is conspicuously darker, as is also the case with the median area, so that the back appears to have three longitudinal dark bands, with a wide light border outside the lateral dark bands. Only a small light spot is present on each segment in the median dark band.

Length of largest specimen, a female, 6.7 mm.

LOCALITIES.—The type and a number of other specimens were collected by Dr. C. W. Richmond and Dr. L. Stejneger at El Yunque, Puerto Rico, at an altitude of 2800 feet, and are preserved in the U. S. National Museum. The America Museum of Natural History has two of them received in exchange, also other specimens obtained at Coamo Springs, Puerto Rico, on hills east of the hotel, among cacti, grass, and xerophytic bushes, June 6, 1915, F. E. Lutz and A. J. Mutchler, collectors. Three small specimens in the same museum (2 males, 1 female) collected by Dr. Lutz on Mona Island, a small island west of Puerto Rico, Feb. 21–26, 1914, also appear to be of this species.

Philoscia incerta Arcangeli, 1932

Figure 75

Philoscia incerta ARCANGELI, 1932*c*, p. 2 (orig. descr.), Figs. 4–6.

The following description and figures were made from specimens in the American Museum of Natural History.

This is a very small and delicate, rather narrow-bodied species. The dorsal surface is smooth and glossy, bearing a few scattered hairs; these are more numerous and conspicuous on the antennae. The abdomen is rather short but fairly wide at the anterior end.

In a dorsal view the front border of the head is somewhat prominent in the middle. Lateral lobes extremely vestigial, though represented by a very slight, rounded projection close to and extending obliquely downward and under each eye. Head little narrowed below the eyes. Upper border of face fairly prominent, but not distinctly marked by a definite line except toward the sides, where it bends down below the eyes. Antennae setose, rather slender, about half the length of the body. The third article of their flagellum is the longest and is tipped with a fairly long terminal bristle. There is a slight median tubercle between the first antennae.

The first four thoracic segments have the posterior lateral angles well rounded, the fourth less rounded, and not at all extended back. The last three have them considerably and increasingly extended back and

moderately acute. The lateral margins of these segments, especially the more posterior ones, are rather straight.

The abdominal segments 3, 4, and 5 have the triangular backwardly directed points at the rear angles very slightly developed. The telson is broadly triangular, its sides straight. Its apex is not at all rounded off.

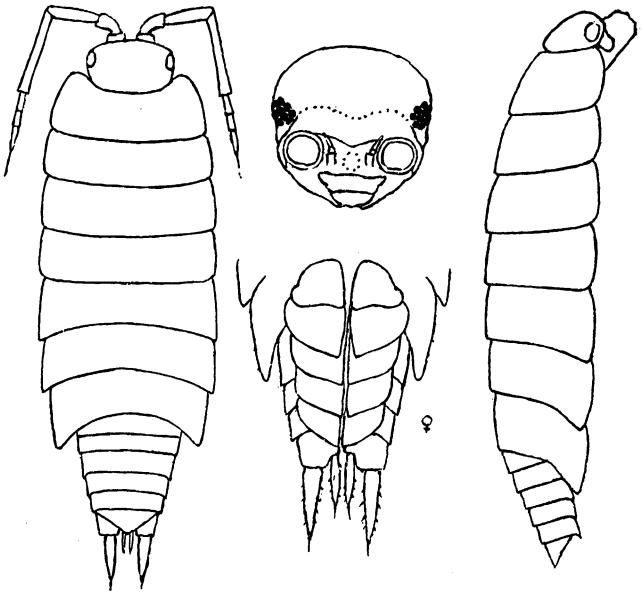

Fig. 75. *Philoscia incerta* Arcangeli.

The color is light brown with small light markings on the head and the lateral regions of the back.

Length of largest specimen (fragmentary) between 3 and 4 mm.

DISTRIBUTION.—Dominica, West Indies. Type locality, Laudat. The American Museum of Natural History has specimens from Laudat, Roseau, and Long Ditton, all in Dominica. Type in the museum of the University of Turin, Italy.

Philoscia moneaguensis, new species

Figure 76

In this species the vestigial lateral lobes of the head, appressed to the sides of the head below the eyes, are small and in a lateral view appear rounded in outline; the telson has the apex rounded off and has its sides slightly convex.

The antennae and exopodites of the uropoda are missing; the legs are rather weak and slender. The eyes are rather large with about ten fairly well-formed ocelli, seven or eight of them pigmented. There is no noticeable median tubercle between the first antennae. The first four segments of the thorax have the rear angles rounded and not extended back, the fourth being somewhat less rounded than the others; V, VI, and VII have them increasingly extended back and moderately acute. The rear angles of the abdominal segments 3, 4, and 5 form only very small appressed points. If we may judge by the single example, the species is an exceptionally

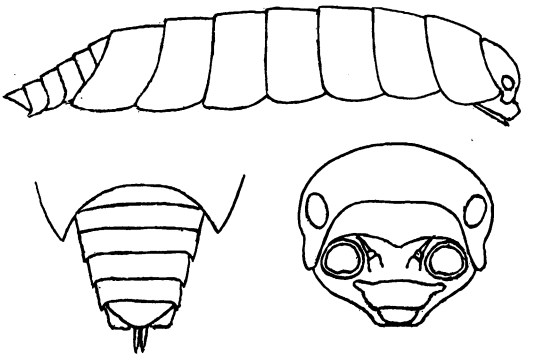

Fig. 76. *Philoscia moneaguensis*, new species.

small one, for the specimen, though apparently a fully adult female bearing four large embryos in the marsupium, two on each side of the body, is only 3.5 mm. long, though the inter-segmental muscles are in a fairly relaxed condition.

LOCALITY.—Moneague, Jamaica, where the type and only specimen was found, is some distance inland. Type in the American Museum of Natural History (Cat. No. 6511).

Philoscia walkeri Pearse, 1915

Figure 77

Philoscia walkeri PEARSE, 1915, p. 541 (orig. descr.) Fig. 4.

"Body very slender; 4 by 1.1 mm. Head nearly one and one-half times as long as broad; front somewhat recurved between sides and middle; sides and posterior margin rounded. First segment of thorax little longer than those following, its anterior margin curved, the posterior margin nearly straight; anterior angles rounded and projecting laterally somewhat beyond the sides of the head. Next six segments about equal in length; last three with postero-lateral angles produced but rounded, angles of last reaching to end of third abdomi-

nal segment. First three abdominal segments about equal in length and shorter than either the fourth or fifth; lateral parts of the first concealed by the last thoracic segment. Telson short, about as long as preceding segment, apex triangular, rounded at tip.

"Eyes rather small, with 10 facets. Second antenna extending to end of third thoracic segment, spinulose; first segment short, second and third subequal in length; fourth one-fourth longer than third; fifth one-third longer than fourth; flagellum 3-segmented, without the slender terminal seta about as long as preceding segment. Mandible with 4-toothed tip; below tip are two plumose setae; lower down a brush; no palp. First maxilla with inner plate armed with two plumose processes; outer plate with eight curved spines.

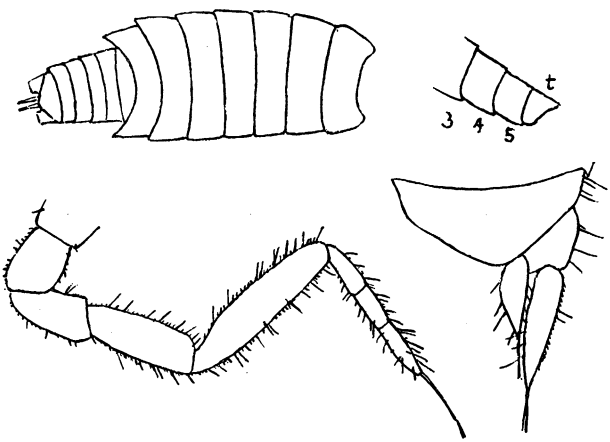

Fig. 77. *Philoscia walkeri* Pearse. Upper figure, outline of body and side view of abdomen, sketched from type in U. S. National Museum. Lower figures, antenna, and telson with uropoda, after Pearse, 1915.

"Legs slightly increasing in length from before backward. Uropods with basal segment broad; outer ramus one-third longer than inner one, tapering; inner ramus broad, oval (Fig. 4).

"Color.—Deep brown; a broad white band across the anterior margin of each thoracic segment (these bands give the isopod a striped appearance); a patch or irregular longitudinal bands extends back from the anterior band on each side of the thoracic segments; head with many small elongated white markings. Ventral surface white. Legs white, mottled with delicate brown markings." (Pearse, 1915, pp. 541, 542.)

I examined and made notes on one of Pearse's specimens labeled "*Philoscia walkeri* type," in the U. S. National Nuseum. The specimen measures about 4 mm. long without the head, which is missing.

The body is rather elongate, the abdomen abruptly narrower, rather long and not much tapered. The body surface is smooth with a few scattered stiff hairs and is rather coarsely marked with light (unpigmented) spots and bars. The anterior parts of the segments are little pigmented, and they have a light rear border also.

Thoracic segments I to IV inclusive have the rear lateral angle rounded and not extended back; V, VI, and VII have it angular, contrary to Pearse's statement, and increasingly extended back.

The points of abdominal segments 3, 4, and 5 are small and appressed and barely noticeable in a dorsal view. Telson broadly triangular, the apex somewhat rounded.

LOCALITIES.—Santa Marta region, Colombia. "This species was fairly common under stones, grass, and logs, and in bromeliads at the top of San Lorenzo (8300 feet) on July 19 and 23. Two specimens were also taken in the forest below at an altitude of about 4500 feet." (Pearse, 1915, p. 542.) Cotypes in University of Michigan Museum and U. S. National Museum. (Pearse.)

Philoscia demerarae Van Name, 1925

Figure 78

Philoscia demerarae VAN NAME, 1925, p. 496 (orig. descr.), Figs. 64–66.—ARCANGELI, 1929, p. 138; 1932*c*, p. 3.

Body elongate-elliptical in outline, the abdomen over one-quarter of the length of body and head; cuticle rather soft and articulation of the segments loose.

"Surface of body fairly smooth, only a few setose hairs are present on most parts of the body and limbs, except on the antennae, where they are fairly numerous. Color pale purplish brown above with small light (unpigmented) spots on the head and a few larger oval, rounded, or somewhat irregular ones on the dorso-lateral regions of the back. The lower parts and limbs bear a little of the purplish pigment in some places.

"Head rounded behind and set well back into the thorax. Seen from above its front outline is sinuous or somewhat three-lobed; the lateral lobes, situated under the eyes, are rounded but extend downward much more than forward or laterally. The most forwardly prominent part of the forehead forms a not very definitely indicated line which,

when seen from in front, dips down in the median region in a V-shaped angle. Directly below the angle and between the minute first antennae there is an oval tubercle. The head is not narrowed below the level of the eyes, and the mouth parts form a large mass which projects obliquely downward and farther forward than the anterior margin of the forehead, so that its anterior part shows in a dorsal view of the body. Eyes well pigmented but with rather few ocelli, about ten being well formed. Second antennae quite long, reaching to the sixth thoracic

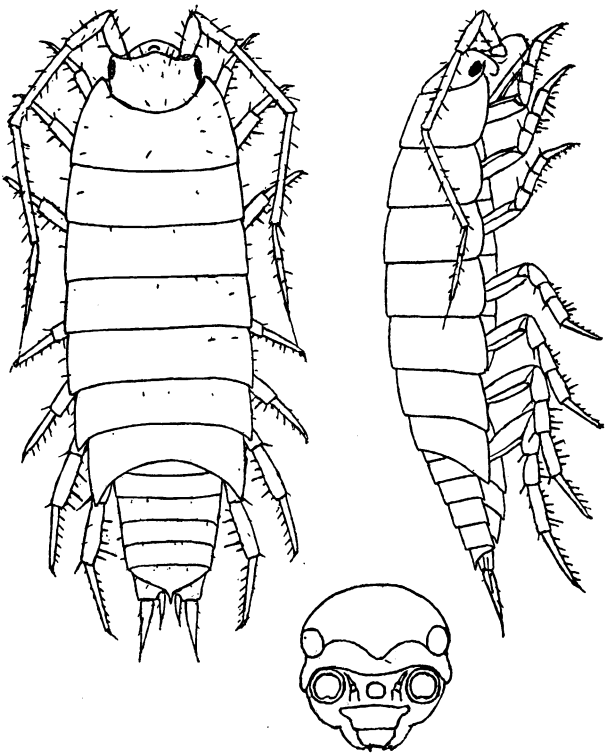

Fig. 78. *Philoscia demerarae* Van Name. Adapted from Van Name, 1925.

segment when strongly drawn back. The flagellum, exclusive of a rather long terminal bristle, is considerably shorter than the last segment of the peduncle. Its first article is the longest, the second somewhat the shortest (the terminal bristle not being included).

"First five thoracic segments with the posterior lateral angles rounded off, the fifth less so than the others, the sixth and seventh have

them sharp. Only fifth (to a slight extent), sixth, and seventh have this angle extended back. Legs long with fairly long and strong spines.

"Abdomen only moderately tapered. The posterior angles of segments three, four, and five are only extended into insignificantly small, appressed points which are hardly noticeable in a dorsal view. Telson wide and short, its sides slightly sinuously curved and its apex strongly acuminate. The basal segments of the uropoda, as well as the external branch of the same, have a furrow on the external aspect." (Van Name, 1925, p. 497.)

No sexual modification of the anterior legs of the male was observed.

Length of the largest specimen (a female, which is also the type) 4.5 mm. It has a well-developed and distended, though empty, marsupium.

LOCALITIES.—Type locality, Kartabo, British Guiana, one specimen collected by William Beebe by sifting in the jungle. This is in the American Museum of Natural History, New York (Cat. No. 5329), which also has over a dozen other specimens, some of them immature, including both sexes, collected at Kumakusa, British Guiana, by Mr. Herbert Lang in 1922 and 1923. The pigmentation of these specimens, especially the immature ones, is very light. Several specimens (not labeled) were also found among material loaned by the University of Michigan Museum. They were collected by Prof. A. S. Pearse at Dunoon, British Guiana.

This small species is easily recognized by the acuminate telson, the conspicuous median tubercle between the first antennae, and the rounding off of the posterior angles of four, and to a less extent also of the fifth; of the thoracic epimera.

The American Museum has several fragmentary specimens all lacking the head and most of the appendages, collected at Port of Spain, Trinidad, in 1910, which may possibly be of this species, but are too incomplete for satisfactory determination. None of them show the acuminate point of the telson, but this may be due to mutilation.

Philoscia diminuta Budde-Lund, 1893

Philoscia diminuta BUDDE-LUND, 1893, p. 120.—DOLLFUS, 1893*a*, p. 345.

"Elongate ovata, convexiuscula, laevis, nitida, in marginibus sparse hirsuta.

"Antennae corpore dimidio aliquanto breviores, hirsutae; flagellum articulo quinto scapi satis brevius, articulus primus articulo secundo

subaequalis, articulo tertio sesqui brevior. Linea marginalis frontalis subrecta, vel medio levissime procurva; lobi frontales latiores, extrorsi, obliqui, subovales; epistoma linea vel carina transversa, in medio sinuata, infra inter antennulas tumidum.

"Trunci segmenta duo vel tria priora margine posteriore curvato, segmenta duo sequentia margine posteriore subrecto, segmenta duo posteriora medio incurvo. Cauda trunco abrupte angustior; epimera adpressa. Segmentum anale brevissimum, quadruplo latius quam longius, triangulum, apice obtuso.

"Color e brunneo fuscus, maculis crebris albidis praesertim in trunci segmentis, capite fusco praeter orem albidum, cauda subunicolore, fusca, maculis tribus parvis rotundis flavis in segmento anali; antennae articulis tribus prioribus albidis, duobus sequentibus cum flagello obscurioribus.

"Long. 3.5 mm. Lat. 1.5 mm." (Budde-Lund, 1893.)

LOCALITIES.—Venezuela: La Moka (first mentioned locality) two specimens; Caracas, one specimen (Budde-Lund).

Philoscia gatunensis Van Name, 1926

Figure 79

Philoscia gatunensis VAN NAME, 1926, p. 12 (orig. descr.), Figs. 21, 22.—ARCANGELI, 1929, p. 138; 1930*a*, pp. 5, 20; 1932*c*, p. 3.

"This small and slender form may easily be distinguished from all the other similar American species with which I am familiar by the lateral lobes of the head that extend down below the eyes, these being of unusually large size, although they do not project forward or outward much and are not very prominent in a dorsal view of the head unless the latter is considerably tilted up. But in a side view they appear large and of squarish outline, with the lower anterior corner rounded off and the lower posterior corner a little produced.

"In addition to its very small size, it is characterized by its narrow, elongate body whose segments, being rather loosely articulated, permit of considerable additional elongation of the body when the intersegmental muscles are relaxed. The back is not greatly arched; the body surface is very smooth and even and practically free from pubescence, though the antennae and, to a less extent, the uropoda bear some short hairs; the color is the usual purplish brown above, with small light-colored markings on the head and dorso-lateral regions of the back; the legs and under parts are practically unpigmented.

"The head is fairly large and rounded, though not wide, and is

somewhat set back into the thorax. Its large but rather closely appressed lateral lobes have already been described; the median part of the forehead is slightly prominent. Eyes wide apart, rather small; ocelli few, apparently not over 10 or 12. Second antennae of moderate length and stoutness, reaching nearly or quite to the fourth thoracic segment when laid back. Flagellum considerably shorter than the last segment of the peduncle; its terminal article the longest and tipped with a rather short terminal bristle.

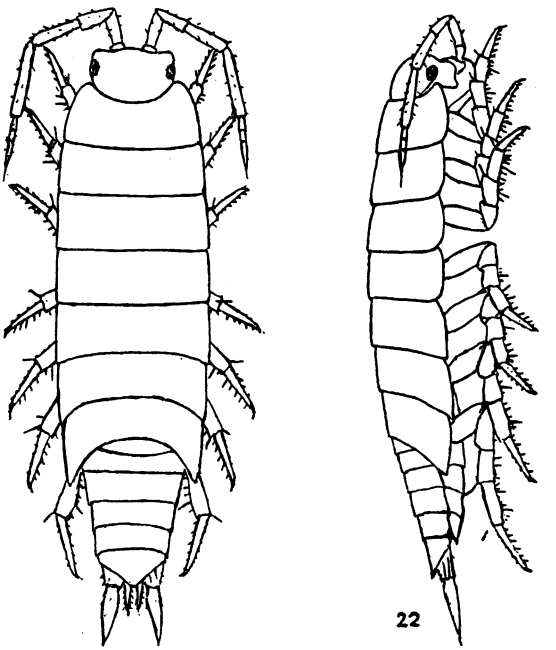

Fig. 79. *Philoscia gatunensis* Van Name. From Van Name, 1926.

"The first four thoracic segments have the posterior lateral corners rounded off and not produced backwards. The last three have the corresponding corners sharp and more or less produced backwards. All have the lateral ends cut off with a somewhat curved outline which, however, is more squarely truncate in the case of the last three or four segments than in the anterior ones. Legs moderately long for the size of the animal. No sexual differences in the legs were noted.

"Abdomen rather long and of smoothly tapering outline when seen from above. The posterior lateral corners of segments 3, 4, and a are

appressed and scarcely at all produced into points, and do not break the smooth, straight outline of the sides of the abdomen in a dorsal view of the same. Telson triangular, wider than long, but not greatly so; its apex fairly acute. Inner branches of uropoda rather narrow and laterally compressed, the outer ones slightly flattened, of sharply tapering outline as seen from above or below." (Van Name, 1926, pp. 12, 13.)

Length of largest specimen (a female with marsupium), 3.75 mm.

LOCALITIES.—Barro Colorado Island, Gatun Lake, Canal Zone. Collected by sifting dead leaves and mould in old-growth forest. Nine specimens, including type, in the American Museum of Natural History (Van Name). Apaican, Costa Rica, one specimen (Arcangeli).

Philoscia paulensis Moreira, 1927

Figure 80

Philoscia paulensis MOREIRA, 1927, p. 194 (orig. descr.), Figs. 1–3.—SCHWENCK, 1927, p. ?, Figs. 2–5 (fide Moreira).—MOREIRA, 1932, p. 426 (descr.), Pl. II.

"Body elongate oval, in length a little more than in width; length 10 mm., width 4.5 mm.

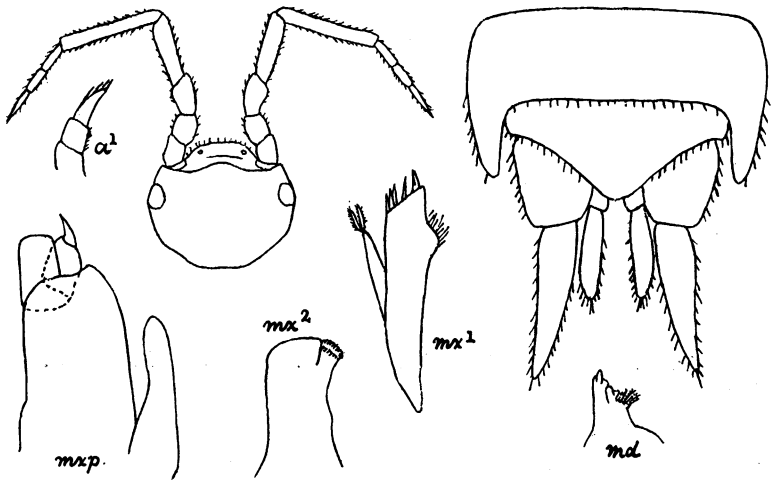

Fig. 80. *Philoscia paulensis* Moreira. Adapted from Moreira, 1927.

"The head is wider than long with the anterior margin sinuous, convex in the middle between the second pair of antennae and concave over their positions; the eyes are small, oval, and situated at the sides of the head; the antennae of the first pair are rudimentary, of three

segments, and very short, reaching hardly halfway along the second segment of the antennae of the second pair. The antennae of the second pair are long, reaching to the fourth thoracic segment; the first segment of these antennae is the shortest, the second a little longer, and the fourth a little larger than the third; the fourth has about double the length of the third, and the fifth is much longer than the fourth; the flagellum is composed of three subequal articles.

"The thoracic segments are equal, the first perhaps slightly the longest; their epimera not distinct. The abdomen is noticeably narrower than the thorax; its first two segments are covered by the last thoracic segment. The lateral parts of the segments are well developed and curved backward; the telson is broadly triangular with a rounded apex. The peduncle of the uropoda reaches to the extremity of the telson, the internal branch reaches a third of the length of the terminal branch of the uropod. All the legs are ambulatory.

"The color of this species is very dark chestnut; on each side of the thoracic segments two light lines extend, of which only the inner is very distinct, and the outer is broken up into spots which disappear on the posterior segments; there are closely placed short, irregular, longitudinal lines on each side of the dorsal part of the segments; leaving a poorly diffused light line along the back.

"Habitat: Found on the ground in a garden in São Paulo. The larger examples are 9 to 10 mm. long and 4.5 mm. wide.

"There is a color variation exhibited by many specimens of this species differing from the typical form in that the longitudinal lines are well defined, the space between them being lighter and the dorsal light line more evident." (Translation of original description.)

Type in the Instituto Biologico de Defesa Agricola, Rio de Janeiro. The fact that it was found in a garden in the city with *Porcellio laevis* and *P. scaber* and *Armadillidium vulgare* may assist in finding it again.

Philoscia briani Arcangeli, 1929

Figure 81

Philoscia briani Arcangeli, 1929, p. 136 (orig. descr.), Fig. 3.—Boone, 1934, pp. 567, 569 (new descr.).—Arcangeli, 1932*c*, p. 3.

Body very elongate, abruptly narrowed at the abdomen, moderately convex, glossy, and bearing scattered, slender setae which are best developed on the abdomen. The outlines of the head are shown in the figures here reproduced. Eyes moderately large, composed of about twenty ocelli. Second antennae slender, setose, more than two-fifths

of the body length, with a flagellum exceeding the terminal joint of the peduncle. The three articles of the flagellum diminish slightly in length from the first to the third. The last article of the peduncle is longitudinally grooved.

Rear angle of the thoracic epimera nearly a right angle in segments I to IV, somewhat acute and produced backward in segments V to VII. The rear angles of abdominal segments 3 to 5 are acute, but very short and bent downward so that the lateral outline of the abdomen appears straight and uninterrupted when seen from above. The basal part of the telson continues the straight converging outline of the abdomen,

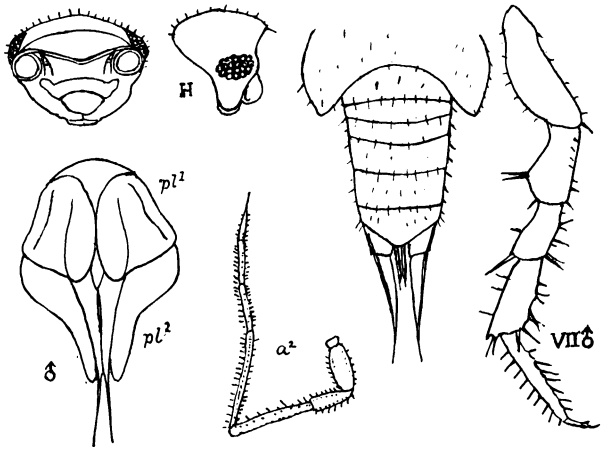

Fig. 81. *Philoscia briani* Arcangeli. H, head, right side. Adapted from Arcangeli, 1929.

the terminal part is triangular, with a slightly rounded apex and a slight median impression on its upper surface. Exopodites of the uropoda grooved on the outside. Endopodites about half the length of the exopodites.

The color is dark chestnut brown with yellowish markings on the dorso-lateral regions of the back and a median row of less distinct yellowish spots; on the abdomen there are additional lateral spots on each side, making three rows. The ends of the seventh thoracic epimera and the rear margins of the abdominal segments, also spots on the telson, and most of the under parts, are yellowish.

Dimensions.—Length, 7 mm.; width, 3 mm.

Localities.—Cuba. A total of fifteen adult (two of them males)

and some young specimens are recorded by Arcangeli. They were taken at Guayabal (first mentioned locality) and Soledad. Boone, 1933, records it from the two following additional Cuban localities: Sierra de Anafe, Prov. Piñar del Rio, and Cojimer.

Philoscia baldonii Arcangeli, 1930

Figure 82

Philoscia baldonii ARCANGELI, 1930*a*, p. 20 (orig. descr.), Fig. 6.

A small species resembling *Philoscia* (*Ischioscia*) *variegata* in general form, though having the body surface somewhat scabrous and setose,

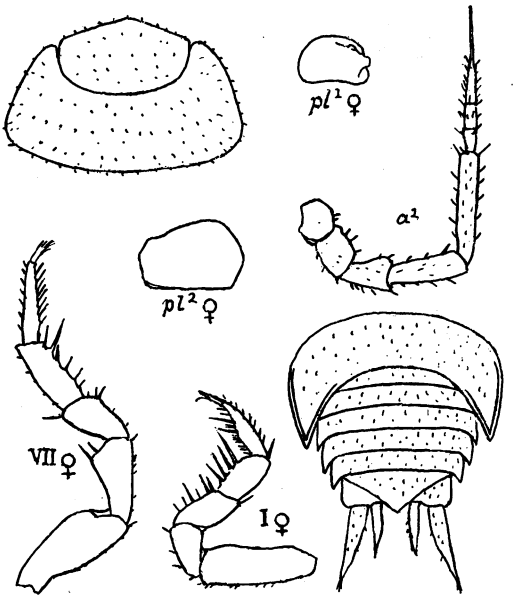

Fig. 82. *Philoscia baldonii* Arcangeli. Adapted from Arcangeli, 1930*a*.

and the eyes entirely wanting. The second antennae are a little less in length than the body, rather stout and setose. The rear lateral angle of the first thoracic segment is slightly obtuse and well rounded. The rear angle begins to become acute and extended backward in the fourth segment, becoming very acute in the seventh. The outlines of Arcangeli's figures here given show the form of the abdominal segments, telson, etc. The pleopoda have no tracheae in the external lamellae. No furrow on the outside of the external branch of the uropoda.

Color white, entirely without pigment.

Dimensions.—Length, 2.05 mm.; width, 1.21 mm.

Many other details may be found in the original description.

LOCALITY.—San José, Costa Rica. Two female specimens collected by Prof. F. Tristan, 1916.

Philoscia langi, new species

Figures 83, 84

Body elliptical in a dorsal view, the front outline of the head evenly convex and the abdomen somewhat narrower than the rear end of the thorax. Back moder-

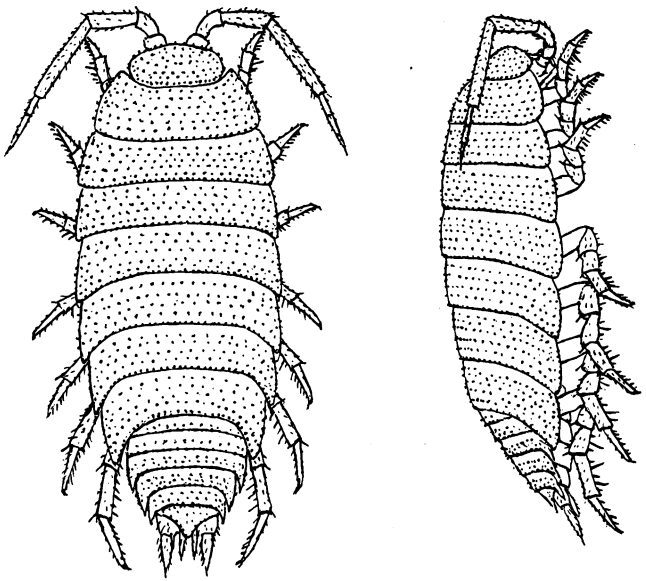

Fig. 83. *Philoscia langi,* new species.

ately convex; the surface rather smooth and even; the exposed parts of the segments little raised above the part that fits under the segment next in front. The whole dorsal surface is fairly thickly covered with more or less club-shaped setae which have a noticeable tendency to arrangement in transverse rows. Along the posterior margin of each segment there is a row of quite closely placed setae; the remainder of the exposed dorsal part in the thoracic segments is occupied by four or more rows of them somewhat less closely and regularly spaced; the abdominal segments have two or three rows, including that along the posterior margin. The antennae, uropoda and legs are covered with short rather stout setae, which, however, are usually not club-shaped like those on the back.

Head without lobes; the forehead rather high and the demarcation between

the forehead and epistome sinuous, dipping down a little in the middle, but not very conspicuously defined. No eyes could be distinguished. Antennae moderately long, reaching the anterior part of the fourth segment when well drawn back. The fifth joint of the peduncle exceeds the third and fourth taken together; the flagellum, exclusive of the rather short terminal spine, is nearly two-thirds the length of the fifth joint of the peduncle and has three distinct articles, the first the longest, and the terminal one the shortest.

First segment of the thorax considerably the longest. All except the first have the rear lateral angles extended backward to an increasing degree as the rear end of the body is approached. Only the first has the angle much rounded off, although their tips are not actually sharp except in the case of the last one or two. The legs are moderately long. A small sexual difference exists in the first pair of legs, the

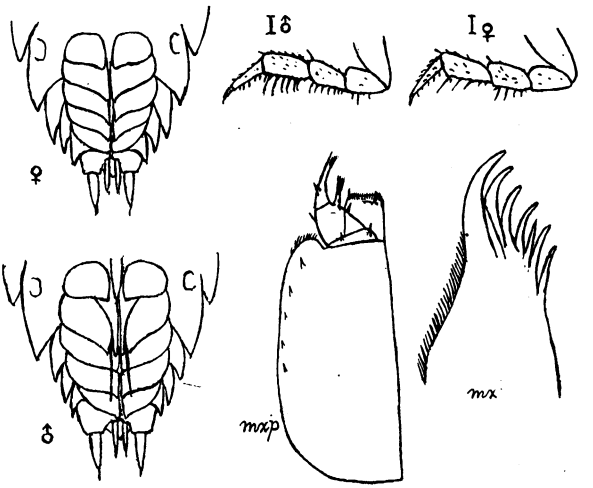

Fig. 84. *Philoscia langi*, new species.

carpus and merus having a slightly larger number of spines arranged in a more regular comb-like row on the inferior aspect of the limb in the male. These show a tendency to be slightly larger and curved, while in the female the spines are fewer, perfectly straight (as on all the other legs also in both sexes) and directed more distally.

The third, fourth, and fifth abdominal segments have the lateral parts extended into rather long, narrow, backwardly directed points. The telson is considerably broader than long, with a fairly acute tip and concave side outlines. The uropoda have the branches rather small, the outer tapering and somewhat terete, the inner shorter and compressed from side to side. The inner division of the second pleopoda in the male is produced into an unusually long spinous process reaching about as far as the end of the fifth segment.

The specimens are practically without pigment. Length of largest specimens (either sex) about 5 mm.

Locality.—Kamakusa, British Guiana, about 35 specimens,

including the type (Cat. No. 6512) in the American Museum of Natural History. They were collected by Mr. Herbert Lang, for whom the species is named, in October, 1922, and January, 1923.

Philoscia pearsei, new species

Figure 85

Philoscia spinosa PEARSE, 1917, p. 7, not Say, 1818, p. 429.

The specimens from British Guiana identified by Professor Pearse with Say's species from Georgia were kindly sent to me for examination by Professor E. P. Creaser of the University of Michigan Museum. I believe that their assignment to Say's very briefly and insufficiently described species is not warranted, as Say would hardly have described the hairs of this species as "small spinelike tubercles." Therefore, I am here treating them as distinct, naming the new species after Prof. Pearse.

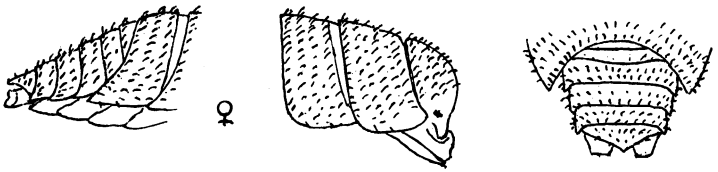

Fig. 85. *Philoscia pearsei,* new species.

P. pearsei bears so close a resemblance to *P. langi* described above that the distinguishing characters can be noticed only on considerable magnification, for the general form and outline of the body and of its more conspicuous parts are very nearly alike in both species. The most noticeable distinctions are shown in the illustrations of the head and abdomen here given. The dorsal surface and the antennae and uropoda are covered with short, bristly, often somewhat curved hairs which are only slightly bulbous at the free ends. They are very easily rubbed off and show a tendency to arrangement in transverse rows, as in *P. langi* (four or five rows on most of the thoracic segments; more on the first thoracic and only one or two on the abdominal segments).

Rudiments of the eyes in the form of small irregular spots of black pigment are present and below these the surface of the head is extended downward into rudimentary lobes closely appressed to the sockets of the antennae and not visible in a dorsal view of the head unless it is considerably tilted up. The demarcation between the forehead and epistome is rather indistinct. The posterior lateral angles of the abdominal segments three, four, and five are extended back into short, closely appressed points, not long and slender ones as in *P. langi.*

Careful comparison of the two species discloses other slight differences. In *P. pearsei* the legs, antennae, and uropoda are a little stouter and the rear lateral angles of thoracic segments II are rounded and not as much produced backward, a slight tendency to their backward extension being noticeable first in segment III, in which the angles are also somewhat rounded off. There is a sexual difference in the spines on the anterior legs, as in *P. langi.*

Except for the eye spots, the specimens are practically unpigmented.

Size apparently somewhat less than that of *P. langi*. Many of the specimens are less than 4 mm. long and the largest, a female, if complete, would probably not exceed 4.5 mm. in the length of the head and body.

LOCALITY.—Near Dunoon, British Guiana, in rotten wood, both in clay jungle and in the Labba Creek sand hills. Specimens, including type, in University of Michigan Museum. Cotypes in the American Museum of Natural History.

Philoscia spinosa Say, 1818

Philoscia spinosa SAY, 1818, p. 429 (orig. descr.).—DE KAY, 1844, p. 50.—BUDDE-LUND, 1879, p. 2; 1885, p. 223.—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1900*a*, p. 305; 1901, p. 565; 1905, p. 608 (descr.).

Probably not *Philoscia spinosa* PEARSE, 1917. See remarks below.

"Brown, oblong-oval, with numerous spines above; feet armed with short setae beneath.

"Inhabits Georgia.

"Cabinet of the academy.

"Body brown, elongate-oval, armed with numerous spine-like tubercles; sixth and seventh segments produced on each side behind, acute, the latter attaining the base of the fifth succeeding joint; abdominal and caudal segments somewhat glabrous, terminal segment surpassing the first joint of the lateral styles; antennae rough and subspinose before, terminal joint glabrous, pale; feet beneath armed with short, distant setae.

"Length nearly one-fifth of an inch.

"Under stones, old wood, etc., in moist situations near Savannah, Georgia." (Say, 1818, pp. 429, 430.)

Nothing is known about this species other than Say's brief description, and I think that the probabilities are so strongly against the identity of the form from British Guiana that Pearse assigns to this species, that I am treating his form as distinct under the name *Philoscia pearsei*.

THE HALOPHILOSCIA GROUP

Verhoeff (1908*a*, p. 340) separated certain Old World species inhabiting the sea coasts from the other Philoscias as the tribe Halophilosciini, containing the genera *Halophiloscia* and *Stenophiloscia* (see also Verhoeff, Arch. Biontol, II, pp. 128–133). Many years later Kesselyak (1930, Studia Zoologica, I, pp. 256–258, and Zool. Anziger, XCII, pp. 282–284, Figs. 1, 2) made the interesting discovery that *Halophiloscia*

and *Stenophiloscia* have the vasa deferentia separate for their entire length and leading into paired copulatory appendages instead of a single median one; an apparently primitive character unique in the Oniscoidea but occurring in aquatic isopods. There is also a peculiar muscular thickening of a part of the wall of the vasa deferentia. Kesselyak considers these characters to be of great taxonomic importance and establishes for these genera a separate subfamily, Halophilosciinae, of the Oniscidae, in spite of their resemblance to *Philoscia* in most characters.

It seems rather probable that the next following five species (*P. culebrae, culebroides, richardsonae, nomae,* and *bermudensis*) may belong in the Halophilosciinae instead of among the true *Philoscias.* This question can only be settled when there is available a sufficiency of fresh or well-preserved male specimens for the study of the distinctive structures. At present I do not venture to transfer them to that group.

Philoscia culebrae Moore, 1901

Figures 86, 87

Philoscia culebrae Moore, 1901, p. 176 (orig. descr.), Pl. xi, figs. 13–17.—Richardson, 1905, p. 604 (descr.), Fig. 660.—Boone, 1918, p. 602.—Van Name, 1924, pp. 194, 195.

Not *Philoscia culebrae* Pearse, 1915, p. 534, Fig. B (see remarks below).

Body elliptical in a dorsal view moderately elongate, the abdomen rather narrow and tapering. Surface rather thickly dotted with short stiff scabrous hairs; on the antennae the hairs are longer and more conspicuous.

Head short, more than half the width of the first thoracic segment, into which it is set back rather deeply. Its front outline, seen from above, is gently convex with a very slightly projecting lobe under each eye. These lobes, extending downward and only slightly forward, are better visible in a lateral view of the head. In such a view they appear somewhat square; from above or from in front, more triangular.

A considerably arched line, less distinct in the median portion, marks the border of the face. Laterally, it becomes more prominent and bends down along the inner border of the eye. Antennae moderately short; the three articles of the flagellum do not differ very greatly in length, the second being a little the shortest. Eyes moderately large, well pigmented, with over a dozen ocelli, some not very well developed.

Lateral ends of the thoracic segments truncated in a gentle curve, especially in the anterior segments; the posterior corners of the first three conspicuously rounded off, those of the fourth scarcely at all; the fifth, sixth, and seventh are sharp or nearly so. Beginning just percep-

tibly with the fourth segment, the posterior lateral corners are produced backward to an increasing degree.

Legs rather long and strong; first, and to a less extent in the second, pair, there is a difference in the legs in the two sexes, the propodus and carpus being noticeably tumid and the whole legs stouter in the male.

The abdominal segments 3 to 5 inclusive have only small, sharp,

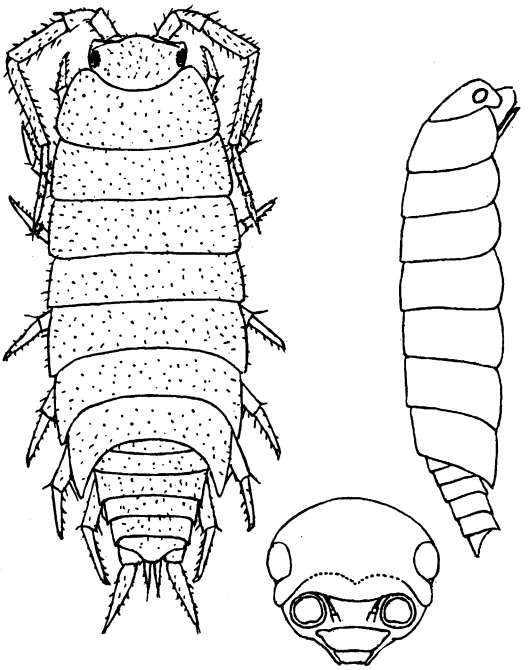

Fig. 86. *Philoscia culebrae* Moore. Specimen from Porto Rico.

posteriorly directed, appressed points. The telson is broad with sinuously concave side outlines and the median part rather broadly rounded behind. The external branches of the uropoda are rather long and gradually tapered; the inner branches comparatively short.

Color.—Pale yellowish brown to light brown above with pale edgings to the segments and numerous small pale yellowish markings as well as larger pale spots on the median line and on the epimera of the thoracic segments; under parts and legs pale yellowish.

Dimensions of type, according to Moore, 4.2 mm. by 1.6 mm.

This species may perhaps belong in the genus *Halophiloscia* Verhoeff.

DISTRIBUTION.—A littoral species found under drift and rubbish on the shores of salt and brackish water. Type locality, Culebra Island, east of Puerto Rico; types in the U. S. National Museum, which also has other specimens from Culebra (at Ensenada Honda), from Puerto Rico (beach at San Juan), and from Caballo Blanco Reef near Vieques Island. The American Museum of Natural History has two from Puerto Rico obtained from the U. S. National Museum, and one from Culebra Island, collected by Prof. W. M. Wheeler.

It is, however, either of much wider distribution, or is represented by very closely allied forms in other coastal regions, since two large, stout female specimens, in the American Museum, one of them 6 mm. long, received from Dr. James Zetek, who collected them at the St.

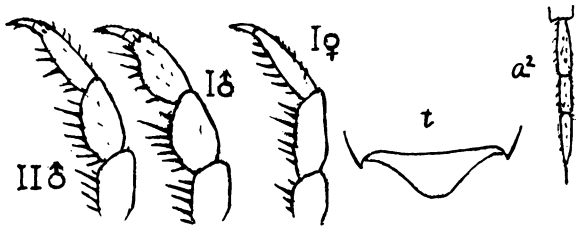

Fig. 87. *Philoscia culebrae* Moore. Specimens from Puerto Rico.

Andrews Islands, Colombia, agree well with those from Culebra in such details as can be studied without dismembering them, but are unpigmented except for thinly but evenly distributed blackish stellate pigment spots.

The American Museum of Natural History also has three specimens, likewise collected under drift and rubbish on the shores of salt or brackish water, two of them from Woods Hole, Massachusetts, and one from Flushing, Long Island, New York, which I refer to this species, although, considering the difference of locality, it would not be surprising if, with more abundant material, some characters might be found to justify separating the northern from the West Indian form. The specimen from Flushing is larger than any West Indian one that I have seen, measuring 6.3 mm. long.

Philoscia culebrae Pearse, 1915, has clearly nothing to do with the present species, as his figure of the telson and uropoda shows. It is,

moreover, a species of high altitude forests, while the present one seems to be confined to the vicinity of sea beaches. See remarks under *P. kartaboana.*

Philoscia culebroides Van Name, 1924

Figure 88

Philoscia culebroides VAN NAME, 1924, p. 193 (orig. descr.), Figs. 11, 12.
Philoscia williamsi VAN NAME, 1924, p. 194 (descr.), Figs. 13–15.

A small and delicate species having the body only moderately wide; the abdomen is small, short, and tapering, though fairly wide at its base,

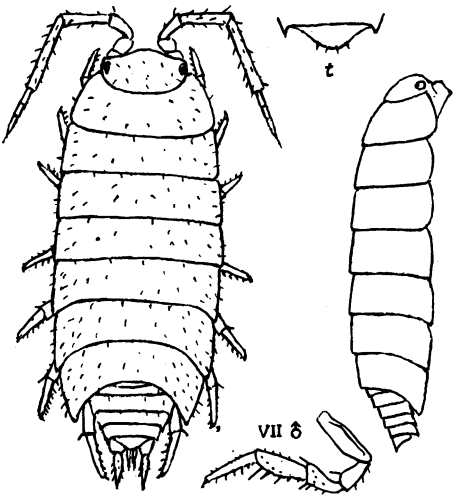

Fig. 88. *Philoscia culebroides* Van Name.

the integument bears scattered setae. Head moderately wide, not abruptly narrowed below the eyes, its front outline convex in the middle; rudimentary lateral lobes of rounded outline are present but are not at all prominent and are too slightly developed to show much except in a lateral view of the head. Eyes rather small and rounded, well pigmented, but the ocelli appear confluent and are not easily counted. Antennae setose; fairly long, exceeding half the body length; the flagellum slender; its terminal article, which bears a strong bristle, is longer than either of the others, which do not differ much in length. No conspicuous tubercle between the first antennae.

The first three thoracic segments have the rear lateral corner rounded, the others have it angular; the fourth very slightly, and the

following ones in an increasing degree have the angle produced backward. The legs are of moderate length, they are stout and have strong spines. The only male specimen is apparently not fully adult, but the carpus and propodus of leg I appear slightly tumid.

The third, fourth, and fifth abdominal segments have the rear lateral angles produced into small, short triangular points. The telson is wide and short, quite broadly rounded at the rear end and with concave, somewhat sinuous side outlines.

Coloration not conspicuous, rather light brown above with the usual light spots and hairs on the lateral regions of the back and additional, rather poorly defined light areas on the basal part of the thoracic epimera. Lower parts and limbs whitish with very little of the brown pigment.

Length of type (largest male), 2.3 mm.; of a female, with its marsupium greatly distended by a number of large larvae, a little over 3.5 mm. (This specimen was originally described as the type of *P. williamsi* Van Name, 1924.)

LOCALITY.—Tower Island, Galapagos, under blocks of lava. Four specimens (two of them very immature) including the type, in the American Museum of Natural History. They were collected by the Williams Galapagos Expedition under Mr. William Beebe, April 18, 1923.

The material available is not sufficient for a satisfactory study of this species, but a re-examination of the specimens I described as two species (*P. culebroides* and *P. williamsi*) in my article (1924) on the Isopoda of the Williams Galapagos Expedition, in the light of studies in the variation of other species of this group with age, sex, etc., leads me to the conclusion that those two species should be united. The name *culebroides* has page priority.

This species, like *P. culebrae*, may really belong in the genus *Halophiloscia* Verhoeff, not among the true Philoscias.

Philoscia richardsonae Holmes and Gay, 1909

Figure 89

Philoscia richardsonae HOLMES AND GAY, 1909, p. 378 (orig. descr.), Fig. 6.—STAFFORD, 1912, p. 127 (descr.), Fig. 71; 1913, p. 170.

"Body oblong-oval, covered with short minute spinules. Head twice as wide as long; frontal margin arched; lateral angles subacute. First thoracic segment longer than the following ones, the last three segments produced backwards at the lateral angles. Antennae about one-half as long as the body, the last joint of the peduncle about as long as the third and fourth; flagellum triarticulate, nearly as long as the fifth

joint of the peduncle, the first and third joints subequal and a little longer than the second; last joint ending in a spine.

"Legs similar, increasing gradually in length from before backwards; and very spiny.

"Abdomen abruptly much narrower than the thorax, the lateral angles of the third, fourth, and fifth segments produced backwards;

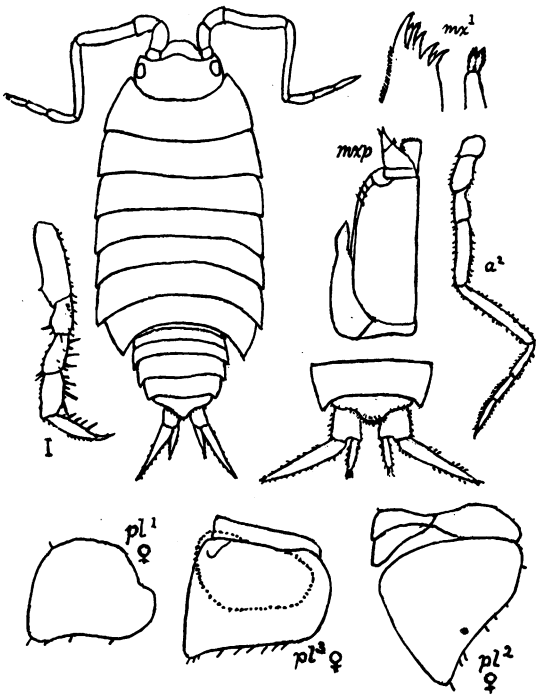

Fig. 89. *Philoscia richardsonae* Holmes and Gay, 1909. Adapted from Holmes and Gay, 1909 (large figure), and Stafford 1912 (details).

last segment over twice as broad as long, with the posterior margin concave on either side of the narrowly rounded tip. Basal joint of the uropods about as broad as long; outer ramus slender, acuminate, subconical, with the outer margin nearly straight and the inner one somewhat convex; inner ramus about one-third the length of the outer, subconical, with narrow blunt tip which is armed with one or more sharp spines; scattered short spines occur on both rami. Length, 5 mm."

LOCALITIES.—San Diego, California, "on moist swampy ground"

(Holmes and Gay, 1909, pp. 378, 379); under old sea weed on the edge of a salt marsh at Laguna Beach, California (Stafford).

This species may be a *Halophiloscia*, not a true *Philoscia*.

Philoscia nomae Van Name, 1924

Figure 90

Philoscia nomae VAN NAME, 1924, p. 196 (orig. descr.), Figs. 16–18.

Based on a mutilated female specimen, lacking the head, uropoda, etc., collected with *Philoscia culebroides* above described, but differing from the specimens of that form in certain minor characters as follows:

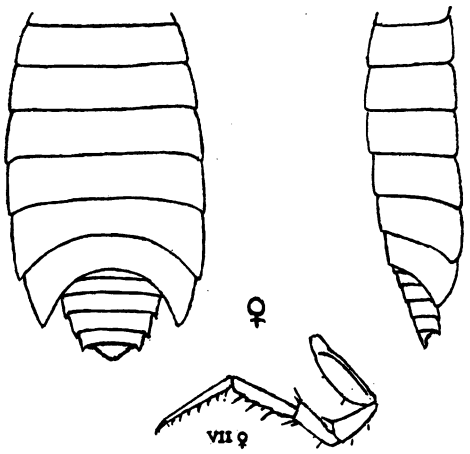

Fig. 90. *Philoscia nomae* Van Name. From Zoologica, V, p. 196.

Larger size (if entire, it would measure about 5 mm. long); wide body; the fourth thoracic segment with the rear angle almost a right angle and not appreciably extended back, and the fifth, sixth and seventh thoracic segments with the rear angles less sharp than in *P. culebroides;* the telson somewhat less broadly rounded. These differences might be individual or entirely deceptive, due to different conditions of contraction or distortion of the integument, but they are accompanied by another difference not so easily dismissed; the legs in the present specimen are decidedly longer and proportionately slenderer, though strong and indicating a species of active habits. Therefore I felt unwilling to assign the specimen to *P. culebroides;* neither have I been able to identify it with any other.

LOCALITY.—Tower Island, Galapagos. Collected by the Williams

Galapagos Expedition under Mr. William Beebe, under lava blocks, April 18, 1923.

Philoscia bermudensis Dahl, 1892

Figure 91

Halophiloscia bermudensis VERHOEFF, 1908*a*, p. 359.—BRIAN, 1929, p. 189.

Philoscia bermudensis DAHL, 1892, part I, p. 111, Pl. III, figs. 2, 4, 5, 7, 8, 10, 13.—VERRILL, 1902, p. 845, Figs. 235*a*–235*d* (name misprinted *bermudense* in caption of illustration).—RICHARDSON, 1905, p. 607, Fig. 664.—ARCANGELI, 1925, p. 52.

This species was not formally described by Dahl, but is well figured

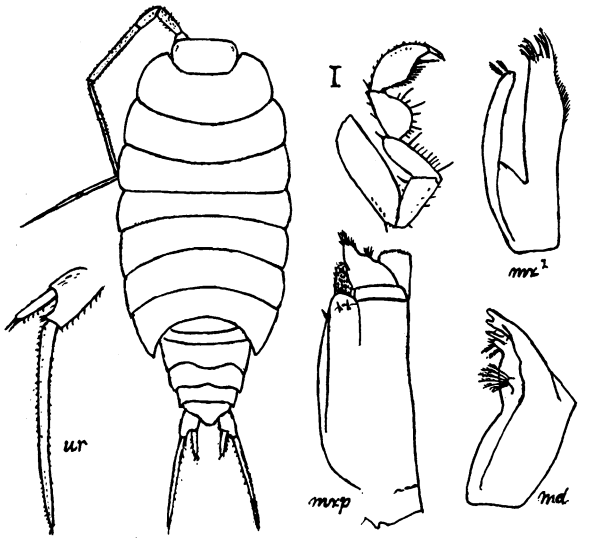

Fig. 91. *Philoscia bermudensis* Dahl. Adapted from Dahl, 1892.

and is compared with an Old World species, *P. couchii* Kinahan, from which it differs in having longer and more slender antennae and uropoda and eyes consisting of small spots of pigment with rudimentary ocelli, it being a cave dwelling species. In the expansion (probably only in the male) of the propodus and carpus of the anterior legs a relationship to *Ischioscia* is suggested.

Length, to tip of telson, about 9 mm.

LOCALITY.—Walsingham Cave, Bermuda (apparently not found by other collectors).

Dahl advances the utterly unjustified theory that this and other species of *Philoscia* evolved directly and independently from various

species of *Ligia*, a genus to which they are in no way really closely related. This manifestly incorrect theory is attacked by Verhoeff (1908*a*, p. 344, and 1908*b*, p. 521, and again in 1916, pp. 158–159).

Verhoeff assigned this species to his genus *Halophiloscia* on the strength of Dahl's figures. It appears to be an aberrant form requiring more investigation.

PHALLONISCUS BUDDE-LUND, 1908

This genus was established by Budde-Lund (1908*a*, p. 296) for two New Zealand species, *Oniscus punctatus* G. M. Thompson, 1879, being the first mentioned and therefore the type. He states that the genus includes two other undescribed species, the locality of which he does not mention, and *Philoscia anomala* Dollfus from Chile (see below). Budde-Lund gives no diagnosis but mentions the following characters: flagellum of antenna of three articles. Mandibles with one free brush-like tuft ("freien pinselformigen Anhang"). Mala of maxillipeds with spines on the tip. Inner division of first pair of pleopoda of male greatly developed and thickened at the end, even more than in *Alloniscus*. Wahrberg, 1922, p. 86 ff., discusses the genus, which he regards as intermediate between *Oniscus* and *Philoscia* but not particularly close to *Alloniscus*, and describes the New Zealand species in detail.

Both these authors appear to have based the details they give about the genus entirely on the New Zealand forms, and it is worthy of note that they omit mention of the modifications in the legs of the male which Dollfus makes one of the principal characters of his South American species.

Phalloniscus anomalus (Dollfus), 1890

Figure 92

Phalloniscus anomalus BUDDE-LUND, 1908*a*, p. 296.—WAHRBERG, 1922, p. 86.
Philoscia anomala DOLLFUS, 1890, p. 66 (orig. descr.), Pl. II, figs. 1–1*d*; 1893*a*, p. 343 (*Philoscia ammala*, misprint).—STEBBING, 1893, p. 431.

"Corps oval, peu convexe, couvert de granulations très fines; pleon en retrait peu sensible.

"Cephalon.—Lobes latéraux étroits allongés, s'inflechissant latéralment et dépassant le trou des antennes externes. Lobe médian à peine marqué. Epistome (sec. Budde-Lund) arrivant jusqu'au bord frontal. Yeux petits; environ 20 ocelles. Antennes externes dépassant la moitié de la longeur du corps; les deux premiers articles du fouet subégaux, le troisième aussi long que les deux premiers segments.

"Pereion.—Bord postérieur des deux premiers segments à peine sinueux de chaque côté; la sinuosité augment jusqu'au 7e segment. Sur chaque segment, une granulation perliforme à la naissance des épimeres et une autre plus marqué de part et d'autre de la ligne médiane. Pattes pereiales chez le mâle adulte (au moment de la copulation?) disposées ainsi; tarses de la première paire munis d'un processus longitudinal étroit; tarses de la troisième pairs très élargis; ceux de la quatrième paire encore plus développe et offrant l'aspect d'une palette presque circulaire, tandis que l'article onguiculé est extrêmement reduit.[1] Derrières paires normales."

"Pleon.—A côtés bien développés, étalés, assez étroits, les trois

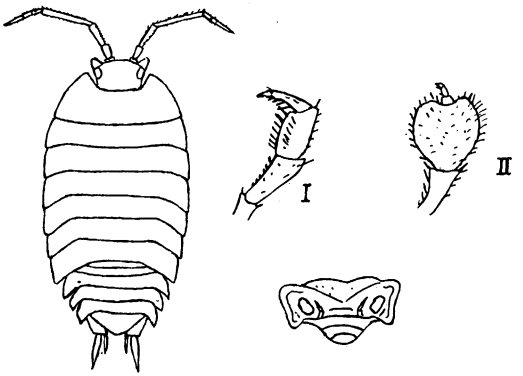

Fig. 92. *Phalloniscus anomalus* (Dollfus). Adapted from Dollfus, 1890.

premiers segments sont munis chacun de deux granulations perliformes.

"Telson.—Triangulaire, arrondi, un peu plus court que large. Telsopodes à article basilaire atteignant l'extremité du telson. Appendice externe deux fois plus long et plus fort que l'appendice interne.

"Couleur.—Brun foncé ou rougeâtre avec des marbrures claires de chaque côté de la ligne médiane, et une tache claire plus nettement delimitée à la naissance des épimeres; pléon irregulièrement taché de clair; pattes plus our moins teintées de brun.

"Dimensions.—Mâle adulte longueur 12 à 13 1/2, largeur 6 1/2 à 6 3/4." (Dollfus, 1890, p. 66.)

LOCALITIES.—Valparaiso, Chile, three males and three females, November, 1875; Juan Fernandez Island, beach.

[1] "Cette disposition si remarquable des pattes ne se présente pas chex tous les mâles de la même espèce; il est donc probable qu'il s'agit là d'un développment temporaire qui coincide sans doute avec la moment de la copulation. . . "

PSEUDOPHILOSCIA BUDDE-LUND, 1904

This genus was established by Budde-Lund, 1904, p. 42, with the following characters:

"Flagellum antennarum 3-articulatum. Pleurae capitis discretae, linea verticalis utrinque post oculos decurrens. Trunci segmentum primum post integrum. Pleopodum rami externes solum operculares, nullis tracheis instructi. Telsum breve, subtriangulum, epimera segmenti paenultimi superans. Uropodes longi, producti; exopoditum longum, hastatum, scapi apici insertum, scapo fere triple longius; endopoditum longum, compressum, exopodito nonnihil brevius.

"Corpus convexiusculum non in globum contractile.

"Trunci segmenta pronotum satis magnum, fere tertiam partem dorsi segmenti aequans, minus manifeste discretum habent."

Budde-Lund placed this genus in his subfamily Spherilloninae, a group no longer recognized, and did not regard it as a near ally of *Philoscia*. Verhoeff, 1926, p. 323, places it in the Oniscidae near *Philoscia*, which has been followed in the present work. The genus contains a number of species in various parts of the southern hemisphere. Stebbing in a footnote in Budde-Lund, 1912, p. 372, points out that *Pseudophiloscia* as a generic name may be a synonym of, and antedated by, *Paraphiloscia* Stebbing, 1900. While I admit such a possibility, the information now available does not seem to justify the rejection of Budde-Lund's genus, at least so far as the South American species is concerned.

Another South American form, *Philoscia angusta* (Dana), see below, never sufficiently described or figured, may also belong in this group.

Pseudophiloscia inflexa Budde-Lund, 1904

Figure 93

Pseudophiloscia inflexa BUDDE-LUND, 1904, p. 43 (orig. descr.), Pl. VI, figs. 1–4; 1912, p. 372.

"Elongata, angusta, convexiuscula.

"Oculi mediocres, ocelli minimi, dense subconfluentes congregati, numero c. 18.

"Antennae dimidium corpus longitudine aequantes, graciles, hirsutae, scapi articuli ad apicem versus gradatim longiores; flagellum scapi articulo 5 paulo longius, articulus 1 flagelli articulis duobus sequentibus subaeque longis subaequalis, articulus 3 seta apicali longiore.

"Frons ab epistomati nisi in lateribus linea marginali non discreta;

epistoma per medium linea transversa, elevata, subrecta, vel in medio leviter procurva. Foramina antennarum magna, tubercula antennaria nulla fere. Clypeus subhorizontalis vel leviter fornicatus, labio magno.

"Truncus.—Segmenta omnia epimeris parvis tenuibus integris; margo posterior segmenti 4 utrinque levissime incurvus, segmenti 5–6–7 medio leviter incurvus. Linea marginalis anterior segmenti 1 collaris, integra ad angulos anticos segmenti ducta et cum linea marginali laterali conjuncta.

"Cauda.—Segmenta omnia subaequalia longiora; epimera segmenti 1–2, perparva sed conspicua, segmenti 3–4–5 parva. Telsum breviter triangulum duplo vel plus latius quam longius.

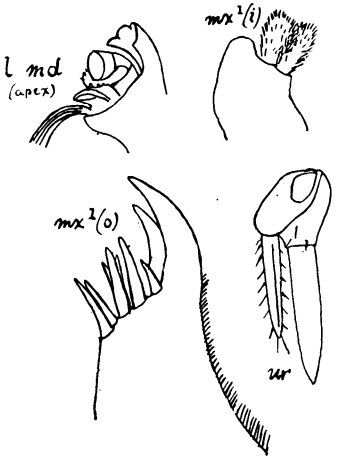

Fig. 93. *Pseudophiloscia inflexa* Budde-Lund. Adapted from Budde-Lund, 1904.

"Long. 9.5 mm. Lat. 3 mm." (Budde-Lund, 1904, pp. 43–44.)

Locality.—Corral, Chile. Type in Berlin Museum.

See remarks on genus *Paraphiloscia* Stebbing under genus *Pseudophiloscia*.

Pseudophiloscia (?) **angusta** (Dana), 1853

Figure 94

Oniscus (?) *angustus* Dana, 1853, p. 731 (orig. descr.), Pl. xlviii, figs. 3*a*–3*d*.—Stuxberg, 1875, p. 43.—Stebbing, 1900*a*, p. 649 (see below).

Philoscia angusta Budde-Lund, 1879, p. 1; 1885, p. 223.

"Body narrow, smooth. Head not embedded in following joint, but prominent, the antero-lateral processes absent, and front a little arcuate.

Abdomen abruptly a little narrower than thorax, sides straight and entire, the segments not being salient either side; last segment short, transverse, triangular.

"Length, four lines. The antennae and stylets are both wanting in our specimens, and the subgenus to which they belong, therefore, is undetermined. The habit of the body is somewhat like that of a *Stylonis-cus;* but the character of the maxillipeds shows that they are not related to that group. The fifth joint of the last pair of legs is very slender, and the short setae on the under side are not longer than the breadth of the joint; the fourth joint of the first pair bears below a few long, slender spines, longer than half the next joint; the fifth joint is very nearly naked.

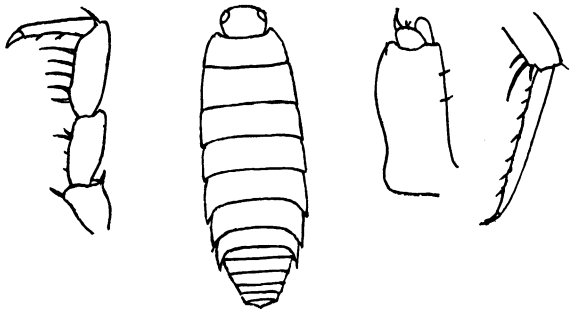

Fig. 94. *Pseudophiloscia*(?) *angusta* (Dana). Adapted from Dana, 1855.

"LOCALITY.—Near Nassau Bay, Tierra del Fuego." (Dana, 1852.)

Stebbing, 1900 (see above), notes a resemblance between this species as described by Dana and his genus *Paraphiloscia* from New Zealand, with which *Pseudophiloscia*, Budde-Lund, perhaps may have to be united (see that genus). It is on the basis of this statement that I have placed this species provisionally in *Pseudophiloscia.*

TROGLOPHILOSCIA BRIAN, 1929

Resembling *Philoscia* in the general form of the body, antennae, etc., but entirely without eyes, and having the setae of the body surface modified into scale-like structures. In the male the endopodites of the second pleopoda each bear a very long slender curved styloid process which reaches beyond the end of the telson.

The following is the type and only species.

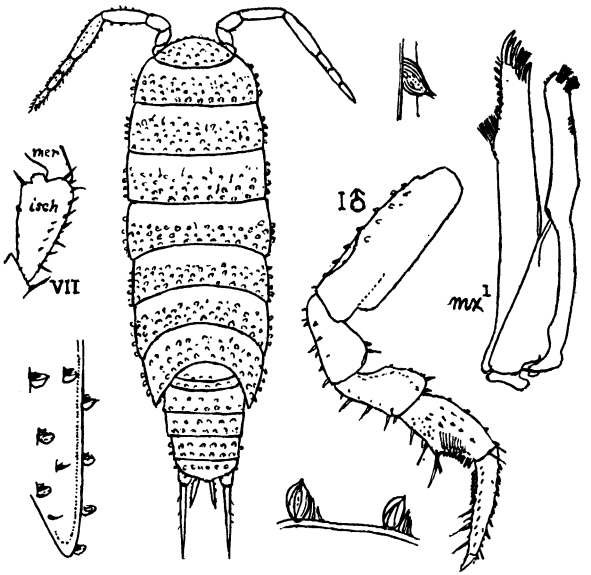

Fig. 95. *Troglophiloscia silvestrii* Brian. Adapted from Brian, 1929.

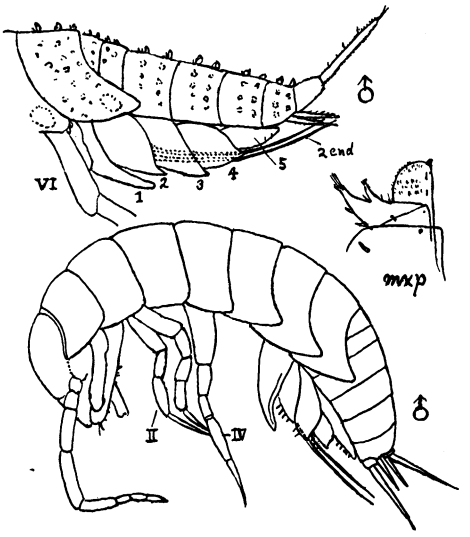

Fig. 96. *Troglophiloscia silvestrii* Brian. Adapted from Brian, 1929.

Troglophiloscia silvestrii Brian, 1929

Figures 95, 96

Troglophiloscia silvestrii BRIAN, 1929, p. 189 (orig. descr.), Pls. I–III.

Described and figured in great detail by Brian. The figures given here, adapted from those of that author, show its main characteristics. Head without a median lobe and only slightly developed lateral lobes. All the teeth on the outer division of the first maxilla are smooth. There is a short truncated projection on the distal end of the ischium of the seventh leg which, according to Brian, is a secondary sexual character.

The telson is short with a rounded and slightly sinuous rear border.

The scale-like structures into which the setae of the body surface are modified show some tendency to arrangement in transverse rows. They are flattened, somewhat curved, bending toward the anterior end of the body and are protected at the base by an imbricated adherent series of three small scales. Color uniform whitish.

Length, 4 to 4 1/2 mm.

LOCALITY.—Seven specimens were obtained by Prof. F. Silvestri in the Bellamar Cave, near Matanzas, Cuba, Oct. 17, 1928, all males, except one small immature female.

ONISCUS LINNAEUS, 1758

In its modern restricted sense this is a very small genus, comprising a few Old World species, one of which has become established in America. It is characterized by the broad body, with expanded epimera, the head with well-developed lateral lobes and an indistinct line between the forehead and epistome. The eyes are large; the antennae have a three-jointed flagellum. No tracheae in the external plates of the pleopoda. In older classifications, many other Oniscoidea having antennae with a three-jointed flagellum were included; or originally, almost any member of the Isopoda.

Oniscus asellus, Linnaeus, 1758

Figures 97, 98

Oniscus affinis SAY, 1818, p. 430.—WHITE, 1847, p. 98.—UNDERWOOD, 1886, p. 361.—RICHARDSON, 1900*a*, p. 305; 1901, p. 563.

Oniscus asellus LINNAEUS, 1758, 'Syst. Nat.,' 10th Ed., p. 637.—GOULD, 1841, p. 336.—DE KAY, 1844, p. 51, Pl. VI, fig. 12.—STEBBING, 1893, p. 430.—UNDERWOOD, 1886, p. 363 (erroneously placed under syns. of *Porcellio scaber*).—RICHARDSON, 1900*a*, p. 305; 1901, p. 562.—STOLLER, 1902, p. 213.—PAULMIER, 1905, p. 180, Fig. 52.—RICHARDSON, 1905, p. 600 (descr.), Fig. 657.—RATHBUN, 1905, p. 45, check list, p. 4.—FOWLER, 1912, p. 235 (descr.), Pl. LXXI.—HUNTSMAN, 1913, p. 274.—PRATT, 1916, p. 379, Fig. 605.—JOHANSEN, 1926*b*, p. 165.—WALKER, 1927,

p. 177.—KUNKEL, 1918, p. 238, Fig. 76.—ARCANGELI, 1926, p. 43.—BLAKE, 1929, p. 11, Fig. 1; 1931, p. 350.—PROCTER, 1933, p. 247.—BIRSTEIN, 1933, p. 473.—PRATT, 1935, p. 442, Fig. 610.

Oniscus murarius BUDDE-LUND, 1879, p. 1; 1885, p. 202.

Oniscus vicarius STUXBERG, 1872, p. 3; 1875, p. 50.—UNDERWOOD, 1886, p. 361.

Porcellio limatus FITCH, 1855, p. 824 (descr.; the following color varieties also described, p. 825: *dorsalis, multiguttatus, marginatus, lateralis, limbalis*); 1856, p. 120.—UNDERWOOD, 1886, p. 362. Budde-Lund, however (1855, p. 124), makes *P. limatus* a doubtful syn. of *Porcellio spinicornis.*

"Body rather regularly oval, greatest width exceeding half the length, dorsal face but slightly convex, and, in adult specimens, nearly smooth, and glossy, in younger specimens of a duller appearance, being

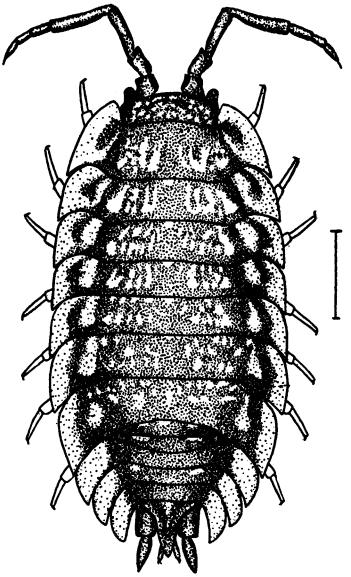

Fig. 97. *Oniscus asellus* Linnaeus. After Paulmier, 1905.

rough owing to small tubercles occuring especially on the anterior part of the body. Cephalon to a great extent flanked by the side-plates of the 1st segment of mesosome, and fully twice as broad as it is long, frontal edge obtusely angular in the middle, lateral lobes rather prominent, narrow linguiform, dorsal face clothed with small rounded tubercles. Side-plates of mesosome greatly prominent, lamellar, subcontiguous, all terminating behind in an acute corner. Metasome about half the length of the mesosome and not much narrower, the 2 anterior seg-

ments very small and wholly embraced by the preceding segment, epimeral plates of the 3 succeeding segments narrowly produced and strongly recurved, the posterior pair extending almost as far as the last segment; the latter much longer than it is broad at the base, outer part narrow conic, convex above. Eyes oval and but slightly convex. Antennulae with the terminal joint about the length of the basal one, and conically tapered. Antennae long and slender exceeding half the length of the body, flagellum shorter than the last peduncular joint, and having the 1st and last articulations of about equal length, the middle one shorter. Legs rather slender, with the outer joints densely spinous inside. Uropoda with the outer ramus narrow lanceolate, and exceeding the basal part in length, inner ramus narrow linear, and ex-

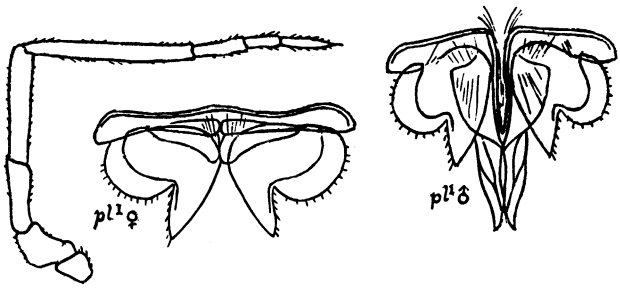

Fig. 98. *Oniscus asellus* Linnaeus. Details. Adapted from Sars, 1899.

tending to about the middle of the outer. Colour of dorsal face in adult specimens dark chocolate, with a regular row of whitish patches along each side of mesosome, at the base of the side-plates, and a few small, opaque white dots nearer the median line. Length of adult female reaching 16 mm." (Sars, 1899, pp. 171–172.)

DISTRIBUTION.—Doubtless introduced from Europe, where it is common and widely distributed. Found in gardens, hot-houses and elsewhere in the vicinity of human settlements. In America it is rather northerly in its distribution, and Richardson, 1905, gives no records south of New York or west of Illinois, but its range no doubt is wider. Hay, 1903, reports it from Cuba without more definite locality, from specimens collected by Dr. C. H. Eigenmann. I know of no other record from south of the United States.

Walker, 1927, gives a summary of the Canadian records which are from Newfoundland and points in the provinces of Ontario and Quebec,

and Blake, 1931, p. 350, a list of New England localities. A record from Greenland (by Sars, 1899) does not appear to have been confirmed since.

Oniscus armatus Nicolet, 1849

Oniscus armatus Nicolet, 1849, p. 270 (orig. descr.).—Stuxberg, 1875, p. 43.—Budde-Lund, 1879, p. 1; 1885, p. 206.

"O. nigrescens, flavescente marmoratus; corpore ovato; capite brevi, lobo intermedio frontis elongato, trianguliformi, recurvo; lobis externis nullis; segmento ultimo abdominis truncato."

"Body oval, rather wide and glossy, head very short but wide and entirely set back into the concavity of the first thoracic segment, whose sides reach to the anterior level of the eyes; forehead vertical, or better described as directed downward, produced in the form of a widened triangle applied to the anterior surface of the head; no lateral lobes; thorax much wider than the abdomen, without unusual characters; abdomen short, with the first segment much longer than the next, which is insignificant, the last presents the form of a sub-rectangular triangle with the extremity truncated. But that which particularly characterizes this species is the arrangement of the stylets or last abdominal appendages; the external pair are stout, long, and acute and inserted so as to diverge laterally, and directed obliquely to the rear; the internal pair are slender, as long as the others, spiniform and acute, and diverge laterally and downward in such a way that in a side view of the animal the two pairs form an angle of about 45 degrees. Color dark blackish brown marbled with dark yellow; the legs and antennae are of the latter color. Length, 3 lines; width, 2 lines." (Translated from original description.)

Locality.—Chile.

This is a species of very doubtful position.

Calycuoniscus Collinge, 1915

This genus was established for a small species found in the Botanic Gardens at Georgetown, British Guiana, having "the cephalon and segments covered with peculiar cup-shaped or calyx-like organs." I have not seen this animal, but it seems hard to believe that these cup-shaped structures represent anything but the glandular hairs found on the body of most land isopods modified into small vesicle-like structures, a change which occurs to a greater or less extent in other genera also, and that their cup-shaped appearance is due to their collapsing in the preserved specimens, so that the free end becomes invaginated into the basal part.

Collinge gave the following generic diagnosis.

"Body oblong-oval, flattened; metasome a little narrower than the mesosome, the cephalon and segments covered with peculiar cup-shaped or calyx-like organs, and the appendages marked with lattice-work and scale-like ornamentation. Cephalon with well marked median and lateral lobes, the former being prolonged forwards and slightly downwards; epistoma raised in the median line, at each side of which is a deep concavity. Antennae of medium length with 3-jointed flagellum, divisions subequal. Uropoda extending beyond telson, globose, basal plate with raised anterior margin; exopodite short and thick, outer border almost straight; endopodite same length as exopodite, both setaceous with terminal hair-like setae. Telson triangular with posterior margin bluntly rounded.

"Affinity doubtful." (Collinge, 1915, p. 509.)

Type *C. bodkini* (see below).

Attention may be called to the fact shown in Collinge's figure of the antenna, that although the flagellum has three articles, the joint between the last two is much less well marked than between the first and second, and is very likely only slightly movable, if at all, thus approaching a two-segmented condition.

Calycuoniscus bodkini Collinge, 1915

Figure 99

Calycuoniscus bodkini COLLINGE, 1915, p. 509 (orig. descr.), Pl. L, figs. 1–12; 1917*a*, p. 29.

The following are characters in the original description additional to those named in the generic diagnosis:

"Eyes prominent, situated dorso-laterally almost above the cup-shaped lateral lobes of the cephalon. Antennulae 3-jointed. Antennae of medium length, the 5th joint being the longest; flagellum 3-jointed, with subequal divisions and terminal style. First maxillae, outer lobe terminating in four large curved spines and four small ones with bifid terminations. Thoracic appendages comparatively short, ornamentation strongly marked, densely covered with setae and spines, and terminating in a strong claw. Uropoda somewhat globose, basal plate with anteriorly raised margin, external antero-lateral margin produced inwards slightly; exopodite short and thick, outer border almost straight; endopodite same length as exopodite articulating beneath the anterior raised margin of the basal plate, both setaceous and with terminal hair-like setae.

"Color (in alcohol) horny brown with darker lateral portions or with dark median line."

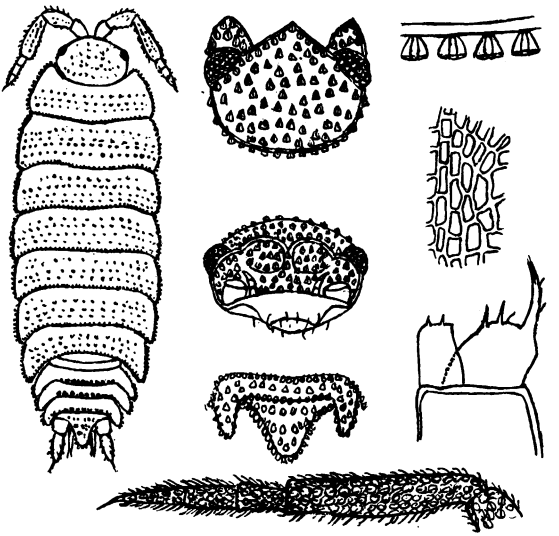

Fig. 99. *Calycuoniscus bodkini* Collinge. Adapted from Collinge, 1915.

Length, 2.8 mm.

LOCALITY.—Botanic Gardens, Georgetown, British Guiana, type locality, a number of specimens found beneath the bark of trees; Guacharo Cave, Trinidad, in material obtained from guacharo's nests, two specimens. Type in collection of W. E. Collinge.

Calycuoniscus spinosus Collinge, 1917

Figure 100

Calycuoniscus spinosus COLLINGE, 1917*a*, p. 29 (orig. descr.), Figs. 1–3.

"Body oblong-oval, slightly convex dorsally; metasome narrower than the mesosome, the segments of both, and also the cephalon, covered with fairly long, bluntly ending spines, and a few cup-shaped organs. Cephalon convex above, cephalic lobes inconspicuous; epistome somewhat long. Eyes prominent, situated dorso-laterally. Antennulae 3-jointed. Antennae of medium length; flagellum 3-jointed, with subequal divisions and terminal style. First maxillae, outer lobe terminating in four large curved spines and four single-pointed smaller ones; inner lobe very short, with widely expanded distal portion on which are two

short, thick setose spines. Maxillipedes very similar to those in *C. bodkini*. The segments of the mesosome have their pleural plates much as in *C. bodkini*. Metasome narrower than in *C. bodkini*, pleural plates not produced backwards. Uropoda somewhat flattened with raised anterior margin on the basal plate; exopodite elongated and longer than the endopodite; both have three or four long terminal setae. Telson short and triangular.

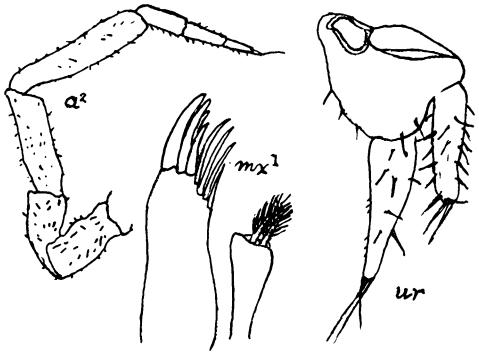

Fig. 100. *Calycuoniscus spinosus* Collinge. Adapted from Collinge, 1917*a*.

"Length 3 mm. Colour orange-yellow.

"Habitat.—In the nests of the guacharo and mostly in the guano. Guacharo Cave, Trinidad, West Indies.

"This species differs from *C. bodkini* in possessing a smaller number of the peculiar chitinous cup-shaped organs on the segments of the body, and they are also more elongated; in the form of the cephalic lobes, which are exceedingly small; the longer epistome; the longer and narrower metasome, and the truncate ending of the pleural plates; and in the form of the uropoda and telson." (Collinge, 1917*a*, pp. 29, 30.)

TRICHORHINA BUDDE-LUND, 1908

Established by Budde-Lund with *Bathytropa thermophila* Dollfus as the type, on the basis of specimens received from Dollfus, and including the four following species from South America (*papillosa, ambigua, quisquiliarum*, and *tomentosa*), which he had previously placed in *Alloniscus*, and one species from Madagascar as additional members. He also states (1908, p. 294) that two undescribed "tropical species" belong in it. The genus was defined as follows by Budde-Lund.

"Superficies setis minutissimis, clavatis dense obtecta.

"Oculi minuti; ocelli numero perparvo. Antennae breves; flagellum biarticulatum, articulo priore quam altero duplo aut triplo breviore. Frons ante vix marginata, in lateribus in processus obtusos minores producta, mandibularum lacinia interior penicillis 2 in mandibula dextra, penicillis 3 in mandibula sinistra; seta inferior biramosa; margo exterior mandibularum serie aculearum munitus. Maxillarum prioris paris lamina exterior dentibus 4 (dens 2. pertenuis) plus 4 (dentes 1. et 3. fissi, 2. et 4. integri); lamina interior spina nulla, post crinita, penicillis inaequalibus, superiore multo crassiore quam inferiore. Maxillipedum mala spina longa et aculeis 2 minutis posterioribus instructa.

"Trunci segmenti 1. linea collaris marginalis utrinque in ramum lateralem continuata. Segmentum 2. pronoto magno, intra angulos laterales desinente, nullo processu laterali; margo posterior leviter curvatus.

"Caudae pleopodum exopodita omnium parium nulla trachea instructa. Telsum breve, triangulum. Uropodum scapus latere exteriore integro." (Budde-Lund, 1908*a*, p. 293.)

This group is a most difficult one and cannot be dealt with satisfactorily in the present state of our knowledge. The species apparently are numerous in tropical America, where many probably remain to be discovered, and few of the known ones have been described sufficiently or figured well enough, if indeed they have been figured at all.

The minute size of the animals, the prevailing absence of striking characters, and the small differences of form and details separating the species, their soft integument, which quickly shrinks and distorts both the whole body and its parts when alcoholic specimens are taken out for examination, and their extreme delicacy, which bears little handling without injury, all combine to make their study difficult. Their description, or even their illustration in a manner to make their future recognition certain without direct comparison of material, is usually a difficult matter, the more so because they are subject to considerable individual variation in many of their characters.

In consequence of this, many of the attempts to refer specimens to previously described forms have led to conclusions clouded by more or less doubt, and have added to the confusion.

Even the correct name for the genus is uncertain, for in the same year that *Trichorhina* was described by Budde-Lund, Verhoeff (1908, p. 173) also recognized that *B. thermophila* differed considerably from the other members of *Bathytropa* and established for it a genus *Bathytropina*,

though he gives no full diagnosis, noting only several superficial differences, as the absence of longitudinal ridges on the segments and that the telson is not truncated in Dollfus' species. It is possible that this name may have priority over *Trichorhina*. I have no information as to the exact dates of publication of the two articles, but that of Verhoeff probably appeared late in the year, as in a footnote in his article Verhoeff refers to a previous one he published "in 1908."

The members of this group have the body surface more or less thickly covered with short hairs or setae which are usually soft and somewhat bulbous at the tip, and in some species are so swollen as to become minute balloon-shaped appendages. They are of delicate structure and easily rubbed off, leaving the surface nearly or quite smooth.

In their wide depressed body, wide head, antennal flagellum with two articles and other characters some of them bear a strong superficial likeness to the Old World genus *Leptotrichus* and have been incorrectly placed in that genus. *Leptotrichus* is a close ally of *Porcellio* (in Budde-Lund's classification a subgenus of it) and has tracheae in the external plates of the anterior pleopoda. But so far as has been reported none of the members of *Trichorhina* have these tracheae, and their relationships appear to be rather with *Oniscus* and *Philoscia*. With the latter genus they are connected by some apparently intermediate species.

The species here included in *Trichorhina* differ considerably among themselves, and it is probable that when their characters are better known there will prove to be grounds for dividing the genus or removing some species which have been included by me. Budde-Lund (1912, p. 382), in fact did propose a new genus *Gedania* for some of them (see remarks under *Trichorhina papillosa*) but did not state on what characters he distinguished it.

Trichorhina barbouri Van Name, 1926

Figure 101

Calycuoniscus barbouri Van Name, 1926, p. 5 (orig. descr.), Figs. 4, 5.—Arcangeli, 1930*a*, p. 5.

Body surface unusually granular (under high magnification like fine sandpaper) when dry, but appearing smooth when wet. It bears numerous short, glandular hairs, which are present also on the antennae, uropoda, etc. These hairs are more or less thickened and enlarged at the end, or club-shaped; they show a tendency to arrangement in transverse rows. Though somewhat erect at its origin, each hair bends backward like a little hook.

Head moderately set back in the thorax, its front outline prominent in the middle with distinct but obtuse lateral lobes. In a side view these lobes appear large and somewhat square, though narrower toward the lower end, descending far below the eyes. Eyes of moderate size, somewhat bulging, and well pigmented, but with few ocelli. Second antennae quite short, not reaching far along the second thoracic segment when drawn back as far as possible. Flagellum with indications of three articles, but the joint between the second and third is indistinct and perhaps not moveable. The terminal article is tipped with short

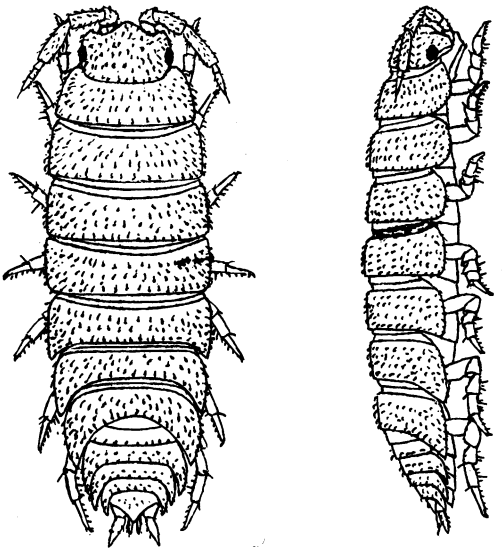

Fig. 101. *Trichorhina barbouri* (Van Name). From Van Name, 1926.

bristle. Upper border of epistome not prominent; it dips down in a V-shaped angle in the middle, each side of which is strongly arched.

The thoracic segments have the exposed part considerably elevated above the portion that slides under the segment next in front, and a distinct though shallow transverse groove separates these two parts of the segment.

Color purplish brown above, with small oval light markings on the dorso-lateral regions. Under parts and legs very little pigmented.

Length of only specimen (a female containing several embryos in the marsupium), 3 mm.

Locality.—Barro Colorado Island, Gatun Lake, Panama Canal

Zone, taken by sifting leaves on the ground in old-growth forest, April 4, 1924. Type in the American Museum of Natural History.

The single minute specimen which I have had available is insufficient for a satisfactory study of this species. It seems to be in some respects intermediate between *Trichorhina* and *Calycuoniscus*, Collinge, in which I placed it in my original description. In the degree of modification of the setae it corresponds better with the former genus, to which I have transferred it in this work.

Trichorhina thermophila (Dollfus), 1896

Figure 102

Bathytropa thermophila DOLLFUS, 1896*a*, p. 94 (orig. descr.), Fig. 2.—KRAEPELIN, 1901, p. 204.

Bathytropina thermophila VERHOEFF, 1908, p. 173.

Trichorhina thermophila BUDDE-LUND, 1908*a*, p. 294.

Trichorhina tomentosa BUDDE-LUND, 1912, p. 384 (in part; not the illustrations).

"Corps ovale allongé couvert de poils écailleux; céphalon à lobe médian largement arrondi, lobes latéraux petits; yeux trés petits, antennes à fouet biarticulé, le premier article trois fois plus court que le second; premier segment du péreion à bord postérieur non sinueux;

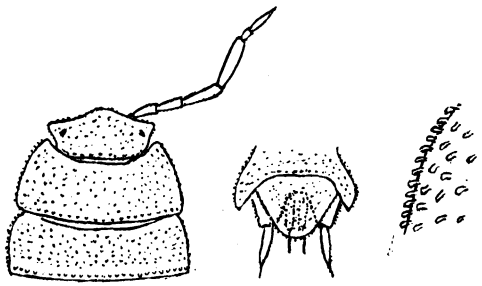

Fig. 102. *Trichorhina thermophila* (Dollfus). Adapted from Dollfus, 1896*a*.

pléotelson aussi long que large, à sommet arrondi; base des uropodes n'atteignant pas l'extrémité du pléotelson; exopodites dépassant sensiblement celui-ci; endopodites atteignant le sommet du pléotelson.

"Couleur.—Blanchâtre.

"Dimensions.—2 millimètres 1/4 sur 1 millimètre." (Dollfus, 1896*a*, p. 94.)

TYPE LOCALITY.—"Serres du Jardin des Plantes, Paris" (Dollfus). Kraepelin, 1906, reports it from Hamburg, imported with orchids from

Nicaragua. Budde-Lund, 1912, p. 384, makes this species a synonym of *Trichorhina tomentosa*, described by himself (1893) from Las Trincheras, Venezuela, and gives several illustrations of its details, as well as a description, which are reproduced here under the heading of that species. Stebbing, who edited this paper after Budde-Lund's death, points out that the telson is described by Budde-Lund as two or more times wider than long and figured with markedly concave sides, which is not at all in correspondence with Dollfus' original description and figures. The conclusion seems inevitable that there has been some confusion of species, in spite of the fact that Budde-Lund, according to his statement, had original specimens received from Dollfus.

In view of this uncertainty, I cannot at present follow Budde-Lund in making this species a synonym of his *tomentosa*, and cannot tell to which species the following additional localities he gives apply: Port au Prince, Haiti; Kingston, Jamaica; Guayaquil and Naranjito, Guayas Province, Ecuador (specimens from all these in Hamburg Museum); "Purnio ob Magdalena" (Göttingen Museum); Kew Gardens, London.

Bathytropa thermophila Dollfus is the type of *Trichorhina* Budde-Lund, 1908*a*, p. 293, and *Bathytropina* Verhoeff, 1908, p. 173.

Trichorhina tomentosa Budde-Lund, 1893

Figure 103

Alloniscus tomentosus Budde-Lund, 1893, pp. 126 (orig. descr.), 127.—Dollfus, 1893*a*, p. 345.

Trichorhina tomentosa Budde-Lund, 1908*a*, p. 294; 1912, pp. 382, 384 (descr.), Pl. xxii, figs. 1–5.

"Superficies squamis vel setis clavatis minutissimis dense obtecta; margo posterior capitis et omnium segmentorum trunci caudaeque serie squamarum majorum setis minutis interpositis munitus.

"Oculi simplices, minuti, aegre pigmentati. Antennae breviores, dimidio corpore breviores; scapi articulus 4 paulo longior quam articulus 2; flagellum scapi articulo 5 longitudine aequale, articulo priore plus duplo breviore quam articulo altero. Frons linea marginali squamarum clavatarum subrecta, in medio levissime producta, ab epistomate discreta; processus frontales laterales parvi, rotundati. Epistoma supra cum fronte productum, linea transversa elevata in medio subrecta utrinque sinuate recurva, infra tuberculo rotundate tetragono inter antennulas munitum; clypeus magnus, porrectus.

"Trunci segmentum 1 margine posteriore curvato, segmenta 2, 3

margine posteriore subrecto, segmenta 4–7 margine posteriore in medio leviter incurvo; anguli postici laterales segmentorum 1–4 rotundate obtusi, segmentorum 5, 6 subrecti, segmenti 7 acutiores. Segmenta 2, 3, 4, stria suturali manifesta in femina.

"Caudae segmenta 3, 4, 5, epimeris majoribus, triangulis, latere exteriore curvato. Telsum breve, triangulum, duplo vel plus latius quam longius, epimera segmenti 5 paululum superans, lateribus subrectis apice obtuso.

"Unicolor, albida vel ex albido grisea.

"Long. 3–3.5 mm. Lat. 1.3–1.5 mm." (Budde-Lund, 1912, p. 384.)

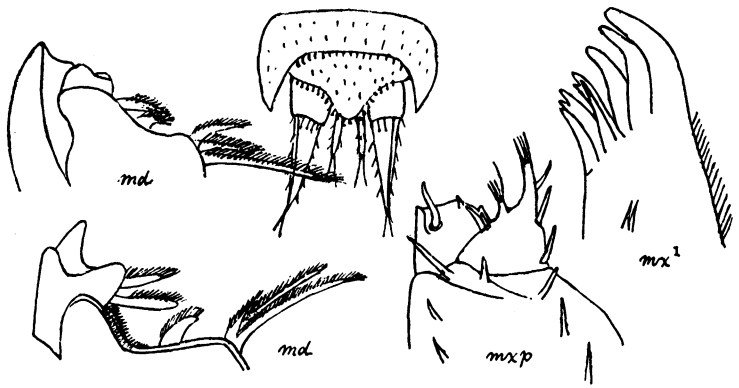

Fig. 103. *Trichorhina tomentosa* (Budde-Lund). Adapted from Budde-Lund, 1912.

Locality of Type.—Las Trincheras, Venezuela. Original description based on a single specimen. Budde-Lund, 1908*a*, gives several other localities in tropical America for this species, in which, however, he includes as a synonym *Trichorhina thermophila* (Dollfus), which may be a distinct species, and to which some or all of these other records may apply instead of to *tomentosa*. See remarks under *Trichorhina thermophila*.

Trichorhina quisquiliarum (Budde-Lund), 1893

Figure 104

Alloniscus quisquiliarum Budde-Lund, 1893, pp. 125 (orig. descr.), 127.—Dollfus, 1893*a*, p. 345.

Trichorhina quisquiliarum Budde-Lund, 1908*a*, p. 294; 1912, p. 384 (descr.), Pl. xxii, fig. 6.—Collinge, 1915, p. 510.

The description by Budde-Lund (1912) is as follows:

"Tota superficies densius setis clavatis obtecta; margo posterior omnium segmentorum serie papillarum minutissimarum ornatus.

"Oculi parvi; ocelli pauci, numero c. 6, quorum solum bini pigmentati. Antennae corporis dimidium longitudine subaequantes; scapi articuli tres priores inter se longitudine subaequales, articulus 4 sesqui longior quam articulus 3; flagelli articulus prior altero fere triplo grevior. Processus frontales laterales parvi, obliqui; epistoma convexum cum fronte paulum productum, infra inter antennulas linea transversa sinuata carinatum.

"Trunci segmenta duo priora margine posteriore curvato, segmentum 3 margine posteriore subtransverso.

"Caudae segmenta 3, 4, 5, epimeris brevioribus et latioribus. Telsum breve triangulum, epimera segmenta 5 vix superans, plus duplo latius quam longius, lateribus late incurvis, apice acutiore.

"Unicolor, alba.

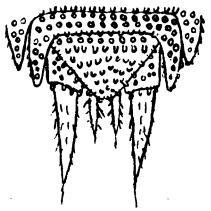

Fig. 104. *Trichorhina quisquiliarum* (Budde-Lund). Adapted from Budde-Lund, 1912.

"Long. 2.8–3 mm. Lat. 1.2–1.3 mm."

LOCALITIES.—Las Trincheras and La Moka, Venezuela, taken by sifting.

Stebbing, in a footnote to the article by Budde-Lund, 1912, p. 385, points out that the illustration that author gives is very far from agreeing with the statement in the description regarding the form of the telson.

Trichorhina simoni (Dollfus), 1893

Figure 105

Bathytropa (?) *simoni* ARCANGELI, 1921, p. 205.

Platyarthrus simoni DOLLFUS, 1893*a*, p. 342 (orig. descr.), Pl. x, figs. 8*a*–8*c*.—COLLINGE, 1915, p. 510.

Trichorhina (?) *simoni* BUDDE-LUND, 1912, p. 382.

"Corps étroit, couvert de stries longitudinales, et de petits poils, qui deviennent écailleux sur les côtés du cephalon et pénicilliares sur le bord du pleotelson.

"Cephalon.—Lobe médian arrondi, lobes latéraux un peu sinueux.

Prosépistome garni de quelques poils longs, épars. Yeux nuls (ou non pigmentés?). Antennes dépassant le deuxième segment pereial. Fouet biarticulé, premier article trois fois plus court que le second.

"Perion.—Premier segment à bord postérieur presque droit.

"Pleon, Telson.—Parties latérales du pleon très étroites, pleopodes dépourvues de trachées. Pleotelson semi-circulaire, garni sur ses bords de pinceaux à poils caractéristiques. Uropodes à base entièrement cachée sous le pleotelson, exopodite lancéolé.

"Couleur.—Blanche, uniforme.

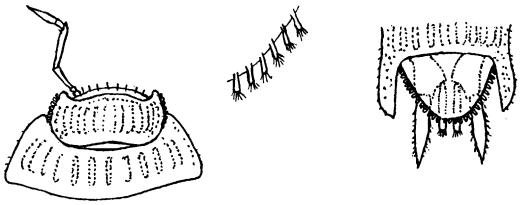

Fig. 105. *Trichorhina simoni* (Dollfus). Adapted from Dollfus, 1893*a*.

"Dimensions.—3 × 1 1/4 mm." (Dollfus, 1893, p. 342.)

Locality.—Colonie Tovar, Venezuela, two female specimens (Dollfus). This place is at considerable altitude.

Trichorhina papillosa (Budde-Lund), 1893

Figure 106

Alloniscus papillosus Budde-Lund, 1893, p. 123 (orig. descr.), p. 127.—Dollfus, 1893*a*, p. 342 (see below), Pl. x, figs. 9*a*–9*c*, *pahillosus*.—Richardson, 1912*c*, p. 31 (see below).

Gedania papillosa Budde-Lund, 1912, p. 382.

Trichorhina papillosa Budde-Lund, 1908*a*, p. 294.

"Oblonge ovalis, convexiusculus; tota superficies setis clavatis densius obtecta, praesertim in capite et in caudae segmentis creberrimis; margo posterior omnium segmentorum serie papillarum minutissimarum ornatus.

"Antennae corporis dimidium longitudine subaequantes, scapi articuli tres priores subaequales, articulus quartus tertio satis longior; flagellum biarticulatum, articulus prior minutus, altero fere quadruplo brevior.

"Processus frontales laterales parvi vel mediocres, oblique rotundati epistoma convexum cum fronte leviter tumidum.

"Trunci segmenta tria priora margine posteriore curvato. Epimera

segmentorum 2–3–4 stria tenuissima, in segmento tertio manifestiore, in segmentis secundo et quarto subdeleta, a medio segmenti discreta.

"Caudae segmentum anale subrecte triangulum, lateribus ad apicem leviter incurvis, apice acuto. Segmenta 3–4–5 epimeris magis acuminatis, segmentum anale epimera segmenti praeanalis paulum superans.

"Color flavus, capite et medio trunco fuscoirroratus, epimeris segmentorum trunci cum apicibus epimerorum caudalium subniger; antennarum basis pallida, articuli 4–5 cum flagello grisei.

"Long. 3.5 mm. Lat. 1.4 mm."

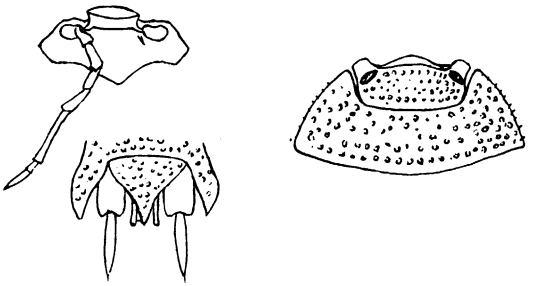

Fig. 106. *Trichorhina papillosa* (Budde-Lund). Adapted from Dollfus, 1893*a*.

LOCALITIES.—One specimen from Los Tejes, Venezuela (first-mentioned locality). Two specimens taken by sifting with other species of the genus in the vicinity of Caracas. Dollfus records it from La Guaira, Venezuela, and makes the following statement about it:

"Les exemplaires que j'ai vus sont un peu plus grands et plus larges que ceux qu'a examinés M. Budde-Lund. Ils atteignent 5 × 2 1/2 mill."

Dollfus gives three figures, the outlines of which are here reproduced. He remarks that the antenna is shown a little too long.

Richardson, 1914, reports this species from near Medellin, Colombia. The specimens from there are of about the same size as those of Budde-Lund, but are marked with reddish brown instead of black. Richardson expresses doubt as to the identity of Dollfus's specimens with Budde-Lund's species, apparently principally on account of their larger size. This does not seem to be a very convincing reason, as Budde-Lund's specimens may not have been fully grown. Indeed, the probability that the specimens from Medellin, which is far inland, and at an altitude of over 4800 feet, should be identical with those from the lowlands near the coast, would seem to be very much less.

Budde-Lund, 1908*a*, transferred this species to the new genus *Trichorhina*, which he established with *Bathytropa thermophila* as type. In his last paper (1912), which appeared after his death, he makes this species and *Trichorhina ambigua* (Budde-Lund), 1893, the representatives of a new genus, *Gedania*, regarding whose characters he gives no information whatever except that they are "different in the mouth parts" from *Trichorhina*. The present species, as the first mentioned, must be taken as the type of *Gedania*. This may be a sufficiently well distinguished group, but as no intimation of what its characters are has been given, and as neither of the two species assigned to it has been sufficiently described or figured, it seems best to postpone its recognition and leave the species in *Trichorhina* for the present. Budde-Lund informs us (1912) that *Gedania* has several representatives in South America not yet described.

Trichorhina ambigua (Budde-Lund), 1893

Alloniscus ambiguus BUDDE-LUND, 1893, pp. 124 (orig. descr.), 127.—DOLLFUS, 1893*a*, p. 345.

Gedania ambigua BUDDE-LUND, 1912, pp. 382.

Trichorhina ambigua BUDDE-LUND, 1908*a*, p. 294.

"Oblonge ovalis, convexiusculus; statura et habitu speciei praecedenti similis et affinis, tamen plurimis indicibus differt. Tota superficies sparsius setigera.

"Flagellum antennarum biarticulatum, articulus prior altero triplo brevior. Processus frontales laterales parvi, oblique rotundati; epistoma convexum cum fronte tumidum et subtriangule productum.

"Trunci segmentum primum margine posteriore curvato, segmenta 2–3–4 margine posteriore subtransverso, utrinque ad latera puncta impressa, levissime sinuata. Epimera segmentorum 2–3–4 stria tenuissima, maxime ad margine posteriorem manifestiore, a medio segmenti discreta.

"Caudae segmentum anale triangulum, lateribus subrectis, apice late rotundate subtruncato, supra ad longitudinem paulisper impressum. Segmenta 3–4–5 epimeris latioribus et brevioribus. Segmentum anale epimera segmenti praeanalis multum superans.

"Color flavus vel brunneus, maculis fuscoviolaceis, praesertim in series quattuor longitudinales condensatis, capite et spimeris obscurior.

"Long. 3.2–3.4 mm. Lat. 1.2–1.3 mm."

LOCALITIES.—La Moka, Venezuela (first mentioned locality); also Caracas, Venezuela, with *T. papillosa* and *Alloniscus compar*.

This species was also included in the insufficiently characterized genus *Gedania* by Budde-Lund in his last work (see remarks under *Trichorhina papillosa*).

Trichorhina marianii Arcangeli, 1930

Figure 107

Trichorhina marianii Arcangeli, 1930*a*, p. 15 (orig. descr.), Fig. 4; 1931*a*, pp. 11, 18.

The following characters, gathered from Arcangeli's detailed description, supplement those clearly indicated in his figures here reproduced in outline.

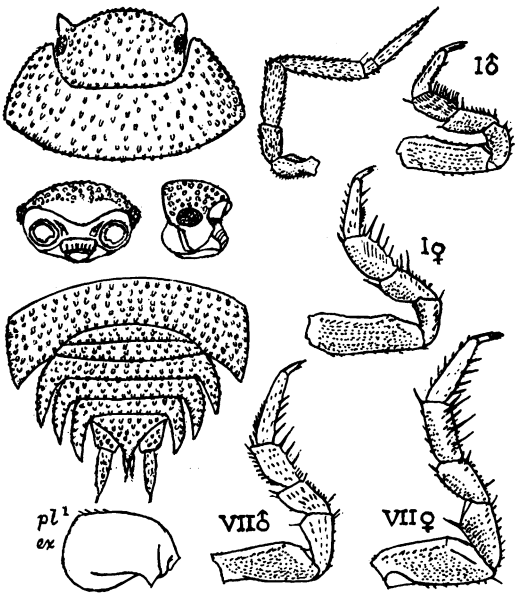

Fig. 107. *Trichorhina marianii* Arcangeli. Adapted from Arcangeli, 1930*a*.

Body oval, moderately convex, surface not granular but with very slight rugosities on the head and the dorso-lateral regions of the thorax, rather thickly covered with clavate setae smaller than those of *T. giannellii*.

The head has moderately developed downwardly and outwardly extending lateral lobes of somewhat triangular form, with the distal end quite sharply rounded (according to Arcangeli's figure also conspicuously projecting toward the front). Antennae setose, long enough

to be drawn back beyond the rear margin of segment II; their flagellum has the terminal one of the two articles more than three times as long as the proximal one.

The rear angles of the three anterior thoracic segments are rounded (more in segment II than in I, but less in segment III); slightly acute in IV and extended a little back in the following ones but not very sharp even in segment VII. The legs are fairly stout, those of the males differ little from those of the females, but have the merus and carpus a little shorter and stouter.

Telson with the dorsal surface slightly convex, the distal part scarcely perceptibly concaved.

Color.—Maroon brown dorsally with smoky whitish markings, the pigmentation extending with less intensity to the lower parts and appendages, except the pleopoda. Protopodite of uropoda lighter. Some individuals are paler colored.

Length, 4 mm.; width about 2 mm. Males smaller.

LOCALITIES.—Several places in Costa Rica: San Juan (first mentioned locality), Puente de las Mulas, and Faldas Vulcan Irazu.

Trichorhina pittieri (Pearse), 1921

Figures 108, 109

Leptotrichus pittieri PEARSE, 1921, p. 460 (orig. descr.), Fig. 1.—VAN NAME, 1925, p. 486 (descr.), Figs. 37–42; 1926, p. 3.—ARCANGELI, 1929, pp. 134, 135.

Trichorhina pittieri ARCANGELI, 1930*a*, p. 15.

"Surface of body covered with peculiar processes; epimera and appendages with many small spines. Head with prominent lateral lobes,

108 *Trichorhina pittieri* (Pearse). Adapted from Pearse, 1921.

which are rather angular anteriorly; frontal margin making an obtuse angle. Eyes very small. Second antenna with fourth segment of peduncle longest; second segment of flagellum nearly thrice the length of first. Thoracic segment with lateral parts broadly expanded; the first a little longer than the others, which are subequal in length. First

two abdominal segments with lateral parts undeveloped. The third, fourth, and fifth are broadly expanded laterally and form a continuous line with the margin of the thoracic segments. Posterior segment with

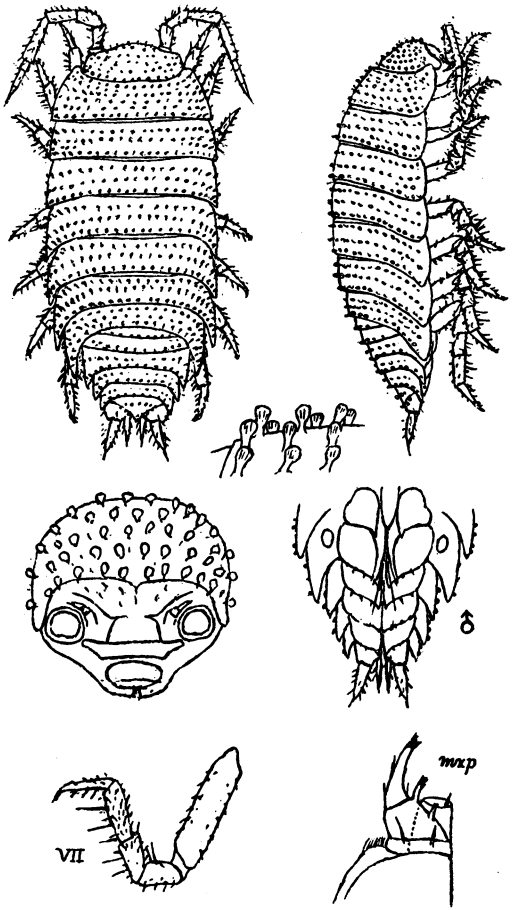

Fig. 109. *Trichorhina pittieri* (Pearse). Specimens from British Guiana in the American Museum of Natural History.

posterior lateral margins very slightly concave, rounded at apex; extending half its length beyond the preceding segment. Basal segment of uropod half the length of the exopod which is slender and conical; endopod linear and two-thirds as long as exopod." (Pearse, 1921, p. 460.)

LOCALITY.—On shore of Lake Valencia, by paper mill at Maracay, Venezuela, July 23, 1918, under log. Type in University of Michigan Museum (Pearse).

In a previous paper (Van Name, 1925) the writer assigned to this species some specimens in the collection of the American Museum of Natural History collected by Mr. William Beebe at Kartabo, British Guiana, by sifting, and in dead wood. The same Museum has others of the same species collected at Kamakusa, British Guiana, by Mr. Herbert Lang. In most respects, these British Guiana specimens agree well with Pearse's description and figures, though the very small, somewhat angular lateral lobes of the head do not seem to deserve to be designated as "prominent," as they do not project beyond the general convex outline of the head unless the latter is considerably tilted up, and the eyes are so vestigial as to be better called wanting, a condition which Pearse's statement "very small" hardly seems to describe sufficiently. The additional figures given here and the following description are from these British Guiana specimens:

Body of rather delicate structure with the segments loosely articulated, so that the ratio of length to width, and the part of the individual segments left exposed varies considerably with the state of contraction of the muscles. (In the figure given, the segments are shown well drawn together, giving the body a rather wide ovate outline. When the muscles are relaxed, the width is less and the outline more oblong.)

Back moderately convex. All over the dorsal surface, the setae are modified into minute, soft, capitate or club-shaped structures arranged in more or less definite transverse rows. They are easily rubbed off and, when this takes place, the surface is quite smooth. On most of the segments there are three transverse rows of these structures, four on the first thoracic segment and still more on the head, but only one or two on the abdominal segments. On the wider parts of the body, there may be thirty or more in a row.

Head rather wide; in its usual, somewhat deflexed position, its anterior outline appears convex from above; when a little more upturned, it is convex with a more triangular outline, while if still more tilted up, the small, slightly projecting lateral lobes become noticeable above and slightly external to the bases of the second antennae. The latter are moderately short with a flagellum of two distinct articles, the first of which is less than one-third the length of the second, which bears a short terminal bristle. The antennae are conspicuously setose, as are also the uropoda. Eyes so vestigial as to be very hard to demonstrate.

All the thoracic segments except the first have the posterior angle extended backward to an increasing extent as the rear end of the body is approached; it is more or less rounded at the apex, save in the last three, and not very sharp in any of them. The abdominal segments 3, 4, and 5 have the lateral ends bent sharply back and acute, the telson is rather broadly triangular with very slightly concave or nearly straight sides. Uropoda small, the external branch tapering and somewhat terete, the inner branch shorter and flattened so as to appear very narrow in a dorsal view. The inner plate of the second pleopoda of the male is produced into a long, slender bristle.

Color yellowish or yellowish white (unpigmented).

Length, 3 to 4.2 mm., the variation being due in many cases more to the varied state of contraction of the muscles than to real difference in size.

Trichorhina isthmica (Van Name), 1926

Figures 110, 111

Leptotrichus isthmicus VAN NAME, 1926, p. 3 (orig. descr.), Figs. 1–3.—ARCANGELI, 1929, pp. 134, 135; 1930*a*, pp. 2, 15.

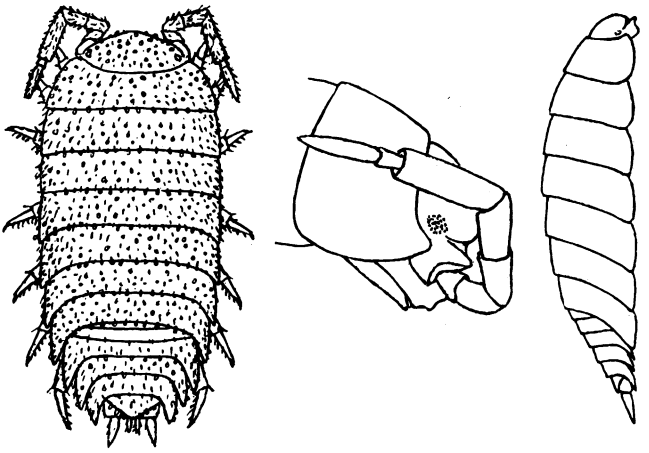

Fig. 110. *Trichorhina isthmica* (Van Name). From Van Name, 1926.

Body surface fairly even, but rather thickly provided with short, thick, glandular hairs, some of which are swollen toward the end, forming minute capitate or club-shaped structures that are easily rubbed off. These are especially developed along the posterior margins of the segments, including the telson, but many are scattered over the dorsal

surface of the head and body. Scattered among them are many short hairs not so modified. There does not appear to be much tendency to arrangement of these structures in transverse rows, except along the posterior margins of the segments.

Head wide and short, its median portion obtusely prominent in a dorsal view. Below each eye a wide, broadly and obliquely truncated lobe extends obliquely outward, and sloping somewhat downward, forms with its concave lower surface a projecting arch over the base of the second antenna. Aside from these projecting lobes, the median part of the head is raised into a prominent median ridge in the region between the first antennae, due to a triangular tumid area extending downward from the lower margin of the forehead meeting a similar upwardly extending tumid area continuous with the clypeus.

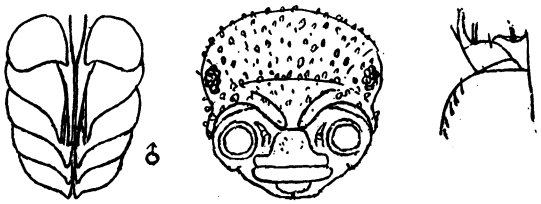

Fig. 111. *Trichorhina isthmica* (Van Name).

The eyes are each composed of seven ocelli, fairly well formed but not much pigmented. The antennae are large and stout and, if strongly drawn back, would reach the third thoracic segment. Their flagellum has two articles, the first is hardly one-third the length of the terminal one.

Only the first two thoracic segments have the posterior lateral angle much rounded; it becomes gradually more acute and more extended back in the third and following segments. The abdominal segments 3, 4, and 5 have the epimera moderately long and acute and bent almost directly backward. The telson is widely triangular, straight sided, and slightly rounded at the extreme tip only.

Color yellowish white.

Length of only specimen (a male) 2.5 mm.

Locality.—Barro Colorado Island, Canal Zone, under a log in old-growth forest. Type and only specimen in the American Museum of Natural History (Cat. No. 5336).

Trichorhina giannellii Arcangeli, 1929

Figure 112

Trichorhina giannellii ARCANGELI, 1929, p. 134 (orig. descr.), Fig. 2; 1930*a*, p. 14 (*T. giannelli*); 1931*a*, pp. 11, 18.—BOONE, 1934, pp. 567, 571, Fig. 2.

According to its describer, this species much resembles *T. pittieri* (Pearse), with which he suggests its possible identity, and also resembles, though less closely, *T. isthmicus* (Van Name). I am inclined to differ with him to the extent of believing it nearer to the latter species than to the former, that is, to the specimens from British Guiana which I suppose to represent Pearse's species.

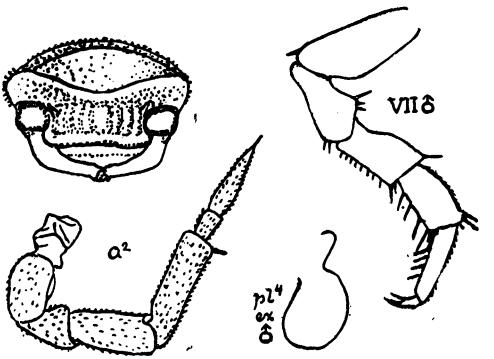

Fig. 112. *Trichorhina gianellii* Arcangeli. Adapted from Arcangeli, 1929.

I can find no trace of the longitudinal furrowing of the mesepistomal region, characteristic of *giannellii*, either in *isthmicus* or in the supposed *pittieri;* the latter has much less-developed lateral lobes and practically no eyes, while I have been unable to place my specimen of *isthmicus* in any position in which its head would present the outlines shown in Arcangeli's figure.

"The whole body is covered dorsally with small clavate setae easily rubbed off, especially conspicuous along the posterior margins of the segments.

"The frontal margin of the head is distinctly marked by a slender line, which forms in the middle an obtuse but definite angle. The lateral lobes, which join medially with the frontal margin in a broadly obtuse and rounded angle, are rather large, rounded, triangular in shape, and fail to reach to the level of the median point of that margin. The true frontal margin is, in fact, not that which is so termed above.

which is seen in a dorsal view of the animal, but is situated below and in advance of the latter, so as to appear shorter on looking at the head from below, appearing in the form of a widely divergent V, which passes into the lateral lobes at its extremities. Together with the false frontal margin, it limits a convex area of somewhat lozenge-shaped outline. Mesepistoma wide, with longitudinal ridges, of which the median one is widest." (Translated from Arcangeli, 1929, p. 134.)

The eyes are quite small and not always well or uniformly pigmented; they are composed of four or five extremely small ocelli. Antennae pubescent, capable of being drawn back beyond the rear margin of segment I. Their flagellum has the first of its two articles half the length of the second.

The rear angles of the thoracic segments I to III are rounded, the angles beginning to extend backward and to become acute in the fourth segment. Arcangeli mentions, but does not describe, sexual differences in the legs.

The telson is triangular, much wider than long, and with nearly straight sides; its surface slightly excavated at the apex and parallel to the sides; its obtuse angled point is at about the level of the ends of the basal segments of the uropoda.

Arcangeli (1929) remarks on the variability which his large series shows in the relative width and length of the body, the consistency of the integument, the length of the antennae and uropoda, the development of the frontal lobes, etc.

Color yellowish white; specimens from El Cobre, Cuba, with very light brown pigmentation.

Length, 3.6 mm.; width, 1.35 mm. The male is smaller.

DISTRIBUTION.—Cuba, many specimens from different localities (Guayabal; Santiago de las Vegas; Ruspoli; Guaro; Puerto Boniato, Santiago; El Cobre) reported by Arcangeli, 1929. In a subsequent paper (1930) he reports it also from the following points in Costa Rica: Puente de las Mulas; San José; Origunaco, Apaican; Fuldas Vulcan Irazu; San Juan. Boone, 1933, reports it from Cojimer, Cuba.

Trichorhina bequaerti, new species

Figures 113, 114

Body rather widely elliptical in a dorsal view, and considerably arched, the head wide and short and evenly convex in front, and the abdomen rather small, much set back into the thorax and conforming to the general curvature of the margin of the body in its outline. Body surface not tuberculated; the exposed part of each segment somewhat, though not abruptly, raised above the part that fits under the segment

next in front. Dorsal surface of body and head rather thickly covered with short hairs which become slightly longer on the epimeral regions. Many of these hairs are more or less enlarged at the end or are modified into minute club-shaped or even pear-shaped structures. Generally these are irregularly scattered among the less modified hairs, but along the posterior margin of each segment they form a regular, rather closely placed row.

Head without projecting lobes. Upper margin of epistome not prominent; it forms a sinuous line dipping down in the middle and below each eye. Forehead very high. Eyes small with few and apparently not very well-developed ocelli, but with considerable black pigment. Antennae short, pubescent, with a two-jointed flagellum, the first article hardly half as long as the second exclusive of the short terminal spine that is borne on the latter.

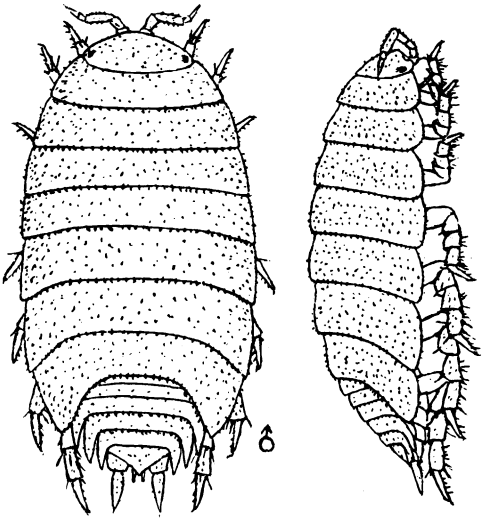

Fig. 113. *Trichorhina bequaerti*, new species.

Left mandible with the tip considerably produced and ending in three teeth, only two of which appear in the position in which it is here illustrated; its lacinia mobilis large and composed of two rounded lobes. The right mandible ends in a single toothlike process and its lacinia mobilis is represented by a lobe or projection ending in a large, slightly concave surface for the reception of the corresponding part of the other mandible when the jaws are closed. Only one "penicillus" (small brushlike process) distal to the large brush was observed on the inner aspect of each mandible; these parts, however, were examined in only one specimen. The outer division of the first maxilla has but six well-developed teeth (3 + 3, all simple, the first being very stout) with an additional slender accessory tooth at the base of the fourth tooth. The thoracic segments from the first to the sixth increase in length

more or less regularly. Their lateral ends are rounded-truncate, the posterior corners being rounded off in the case of the first three and more angular and increasingly produced backward in the posterior ones. The legs are fairly stout and well provided with spines. Sexual differences in them were not observed.

The abdominal segments three, four, and five have the epimeral ends tapering, pointed, and directed almost straight backward. Telson over twice as wide as long, triangular with concave sides. The backwardly extended angles of the first and second pleopoda in the male are rather short. No tracheae were found in their external

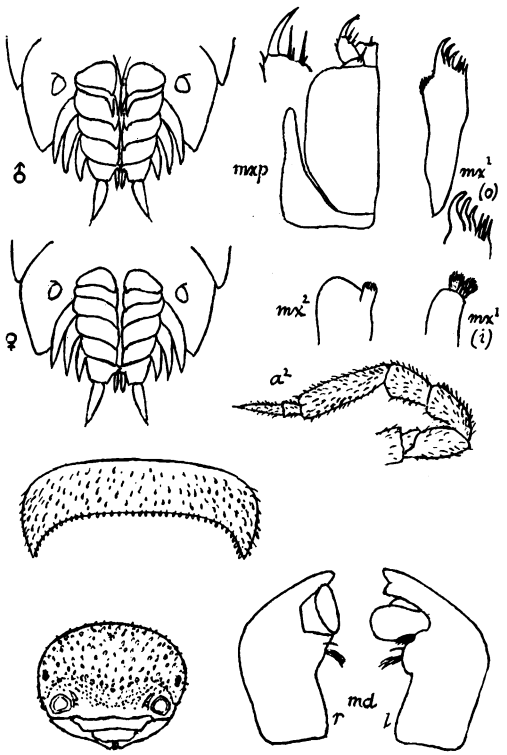

Fig. 114. *Trichorhina bequaerti*, new species.

plates. Uropoda rather short, the outer branches of the usual tapering form, the inner laterally compressed and much smaller than the outer.

Color pale yellowish (unpigmented), except for a slight amount of pale purplish-brown pigment distributed on the dorsal surface of the body and head, mainly in the median region and on the epimeral parts of the segments. The lateral and posterior borders of the segments and rounded or oval spots on the lateral parts of the back are entirely unpigmented, as are the lateral and terminal parts of the abdomen and the entire under parts and the legs. Even where the pigment is present it is very pale and thinly distributed. Length of the largest males and females, between 5 and 6 mm.

LOCALITY.—Cave of Aguas Gordas, Baños, Oriente Province, Cuba. Three specimens, including type (Cat. No. 6523), in the American Museum of Natural History, received from Dr. J. Bequaert, of the Harvard Medical School, for whom the species is named. Cotypes, three specimens, in Museum of Comparative Zoölogy, Cambridge, Massachusetts.

BISILVESTRIA ARCANGELI, 1929

A genus of doubtful relationship established by Arcangeli for the following peculiar species, which he places in the family Oniscidae.

Bisilvestria marrassinii Arcangeli, 1929

Figure 115

Bisilvestria marrassinii ARCANGELI, 1929, p. 138 (orig. descr.), Fig. 4.

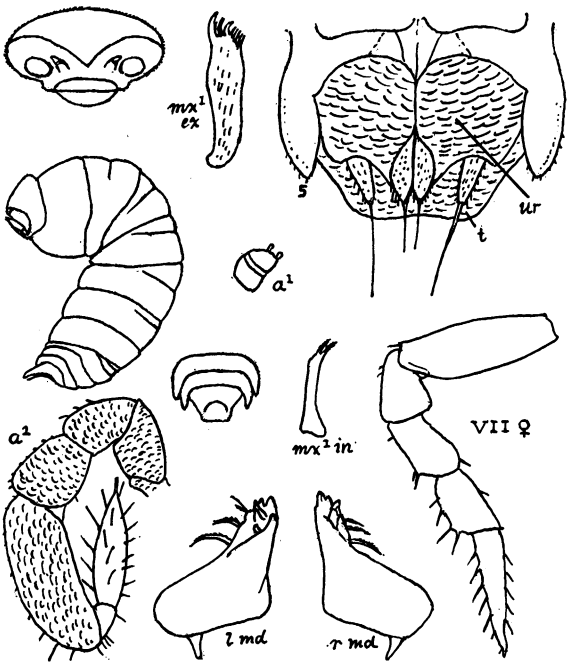

Fig. 115. *Bisilvestria marrassinii* Arcangeli. Adapted from Arcangeli, 1929.

According to the description of that author, who had only female specimens, the body is rather elongate with nearly vertical sides and is capable of rolling up into a ball. Surface covered with very small,

slightly capitate setae, curved toward the rear. They are especially developed on the margins of the segments. There are eight longitudinal ridges on the dorsal surface of each segment, four each side of the median line.

Head wide and short, entirely set back into the thorax; eyes wanting; antennae extremely short and stout with a flagellum of two articles, the first very short.

The external plates of the pleopoda are without tracheae.

The telson has the outline of a broadly truncated triangle, with slightly concave sides; its distal part bends out somewhat horizontally and its upper surface has a large spoon-like concavity bounded in front by a curved line. The telson is so large that it completely covers not only the basal segments, but the branches of the uropoda which are very short, so that these are visible only from below.

The body is unpigmented and somewhat translucent.

Length, 1.2 mm.; width, 0.45.

LOCALITY.—El Cobre, Cuba. Four females collected by Prof. Silvestri. Apparently an inhabitant of humus.

LYPROBIUS BUDDE-LUND, 1885

Budde-Lund, in the above work defined this group as follows, treating it as a subgenus of *Oniscus* and placing it next to *Alloniscus*. It was based on the two species here included and a third one from Algeria known only from a single imperfect specimen. The group is treated as a genus by Richardson, 1905, who also places it next to *Alloniscus*, though judging from the diagnosis and descriptions a position nearer to *Philoscia* might be better.

"Corpus minus convexum, vix contractile. Superficies plerumque setigera, vix granulata.

"Frons ante marginata, in lateribus lobata.

"Trunci annulus primus margine posteriore curvato, duo sequentes subtransversi, quattuor posteriores margine posteriore medio post magis magisque sinuato. Epimera sat magna, angulis posticis annulorum trium priorum rotundate obtusis, angulis annuli quarti subrectis, annulorum trium posteriorum acutioribus.

"Caudae annuli duo priores brevissimi, prior a trunci annulo septimo saepe occultus; annuli tres sequentes mediocres, epimeris magnis, extrorsis, acutis.

"Rami terminales exteriores pedum analium teretiusculi, conici, paulum deplanati, breviores; articulus basalis brevis et latus, latere exteriore sulcato." (Budde-Lund, 1885, pp. 229, 230.)

Lyprobius pusillus Budde-Lund, 1885

Lyprobius pusillus BUDDE-LUND, 1879, p. 1 (*nomen nudum*); 1885, p. 230 (orig. descr.).—RICHARDSON, 1899, p. 864 (Ann. Mag. Nat. Hist., (7), IV, p. 333); 1900*a*, p. 305; 1905, p. 598.—JOHANSEN, 1926*b*, p. 165.

"Body oval, rather convex, smooth, punctate, very minutely setigerous, especially so posteriorly.

"Second pair of antennae a little shorter than half the length of the body; first article of the flagellum equal in length to the third, almost half as long as the second.

"Antero-lateral lobes small, rounded. Front, with the median marginal line entire, a little arched and produced.

"The terminal segment of the abdomen is triangulate in the middle, produced, and extends a little beyond the epimera of the fifth abdominal segment; terminal segment a little excavate above.

"Color uniformly brown, transparent on the margins, white.

"Length, 5 mm.; width, 2.5 mm.; height, 1.2 mm." (Richardson, 1905, p. 598.)

LOCALITIES.—Type locality Sacramento, California ("specimen mutilatum . . . in Museo Schaufuss asservatur." Budde-Lund, 1885).

According to Johansen (1926*b*, p. 165) there is a specimen in the U. S. National Museum collected at Unalaska, Aleutian Islands, by Dall in 1871, which was identified with the present species of Budde-Lund. The information given by Budde-Lund would seem, however, entirely insufficient for any certain recognition of the species.

Lyprobius modestus Budde-Lund, 1885

Lyprobius modestus BUDDE-LUND, 1885, p. 231 (orig. descr.); 1893, p. 127 (see note below); 1908*a*, p. 283 (see note below).

Budde-Lund's original description is as follows:

"Ovalis vel oblonge ovalis, convexiusculus, sparse et regulariter setigero squamatus.

"Antennae exteriores corpore dimidio paulo breviores; articulus primus flagelli quam articulus secundus sesqui brevior; articulus tertius brevissimus, vix conspicuus, decimam partem articuli vix superans.

"Lobi frontales laterales sat magni, rotundati, subsemicirculi, subdeclives; frons medio late triangulo producta, minus manifesto marginata.

"Trunci annuli tres priores margine posteriore curvato; annulus quartus subtransversus; annuli posteriores medio sinuato; epimera mediocria.

"Caudae annulus analis triangulus, brevis, epimera annuli praeanalis satis superans, lateribus leviter incurvis, apice subacuto, supra medio impressus.

"Color flavus crebro nigromaculatus vel potius nigro brunneus et flavomaculatus, ut praesertim tres series longitudinales macularum fingantur.

"Long. 4.5 mm. Lat. 2 mm. Alt. 1 mm."

LOCALITY.—"Corientes," South America (probably in Argentina). Several specimens collected by Will. Sorensen (Budde-Lund, 1885).

No other description or figures of this species appear to have been published. In a later work (1893) Budde-Lund mentions it again, stating that the tracheae in the pleopoda are even more rudimentary than in *Lyprobius cristatus* (= *Nagara cristata*) and that the relationship between these and certain Old World species which he names is not clear to him.

Budde-Lund apparently is referring to this last statement when he mentions (1908*a*, p. 283) that he has already removed *modestus* from *Lyprobius*, though he did not know where to place it. He offers no information on this point, and as I cannot solve the problem with the brief description that Budde-Lund has given I am leaving it in *Lyprobius*. This species apparently has nothing to do with *Porcellio modestus* Dollfus, from Salayer, Dutch East Indies, which Budde-Lund transferred to *Nagara*.

ALLONISCUS DANA, 1856

"Corpus convexiusculum, paulum vel vix contractile. Superficies punctis setigeris crebrata.

"Linea marginalis frontalis deleta, linea marginalis verticalis post oculos in pleuras capitis decurrens, producta. Frons in medio et in lateribus in tubercula producta; tubercula lateralia saepe instar cornus prominentia. Epistoma infra inter antennas tumosum, leviter carinatum.

"Trunci annuli priores margine posteriore curvata, rarius utrinque leviter sinuato. Epimera mediocria vel parva, processus lateralis nullus. Pedes valde spinosi.

"Cauda trunco haud abrupte angustior; annuli duo priores sequentibus breviores, epimeris deletis; annuli tres sequentes epimeris majoribus.

"Rami terminales exteriores pedum analium breves, subteretes, graciles, hirsuti, repandi; rami interiores breves, apice setosi; articulus basalis latus, magnus." (Budde-Lund, 1885, p. 224.)

Budde-Lund (1908*a*, pp. 295–298) discusses this genus and gives further particulars about its characters, especially the following: that the maxilliped has the malar process without spines and covered with short hairs and the palp very short and stout, with the third article much shorter than the second. The external plates of the uropoda are more or less extensively provided with tracheae and in the females, but not in the males, distinct sutures often mark off some of the thoracic epimera. Mandibles with only one free brush-like appendage ("freien pinselformigen Anhang" of Budde-Lund).

More investigation will be needed to determine whether all the species here included will prove to conform to the genus as thus limited.

Alloniscus cornutus Budde-Lund, 1885

Figures 116, 117, 118

Alloniscus cornutus BUDDE-LUND, 1879, p. 1 (*nomen nudum*); 1885, p. 228 (orig. descr.).—STEBBING, 1893, p. 431.—RICHARDSON, 1899, p. 864 (Ann. Mag. Nat. Hist., (7) IV, p. 332); 1900*a*, p. 305; 1905, p. 595 (descr.).—BUDDE-LUND, 1908, p. 298, Pl. XV, figs. 43–47.

Alloniscus cornutus var. *lagunae* STAFFORD, 1913, p. 170 (descr.), Figs. 4, 5.

Not *Alloniscus cornutus* KRAEPELIN, 1901 (= *Arhina porcellioides*).

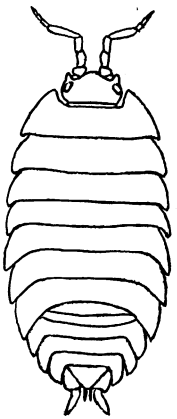

Fig. 116. *Alloniscus cornutus* Budde-Lund. Adapted from Stafford, 1913.

The following is Richardson's translation of the original description:

"Body short, oval, subconvex, obscurely but densely roughened and thickly punctate and setigerous. Second pair of antennae shorter than half the length of the body (7:17); flagellum shorter than the fifth article of the peduncle; the second article of the flagellum shortest, the first equal in length to the third.

"Antero-lateral processes large, narrow, prominent, subconical; front in the middle very much swollen.

"The first three segments of the thorax have the posterior margin on both sides slightly sinuated; all the following segments have the posterior margin in the middle rather sinuated posteriorly.

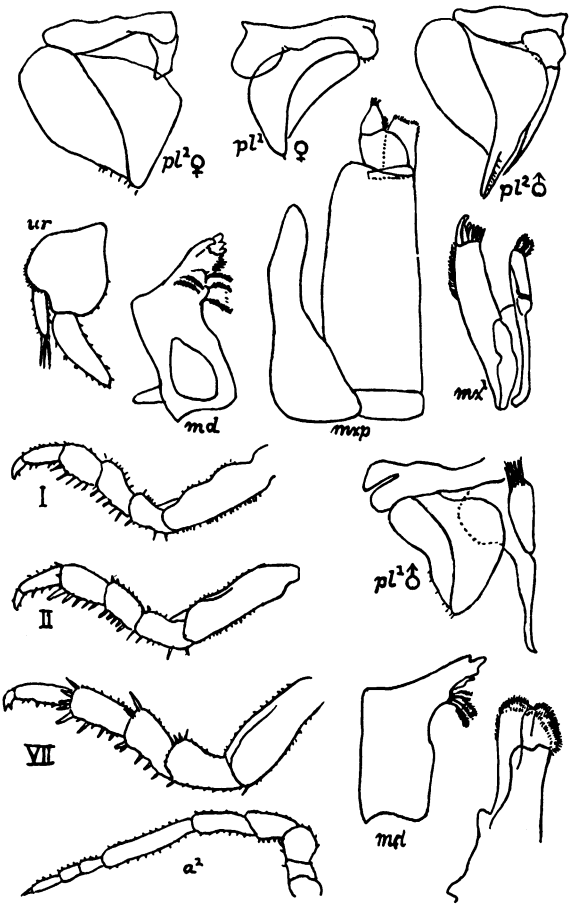

Fig. 117. *Alloniscus cornutus* Budde-Lund. Adapted from Stafford, 1913.

"The first two segments of the abdomen scarcely shorter than the other segments; the epimera of the third, fourth, and fifth segments strong, subtetragonal.

"The terminal abdominal segment is triangular, short, hardly twice as wide as long, rather convex above.

"The basal article of the uropoda is very wide, depressed; the outer branch is carinated, with the apex rounded; the inner branch is inserted at the inner angle of the basal article. Color grayish, pale on the sides. Length, 8.5 mm.; width, 5 mm.; height, 2 mm."

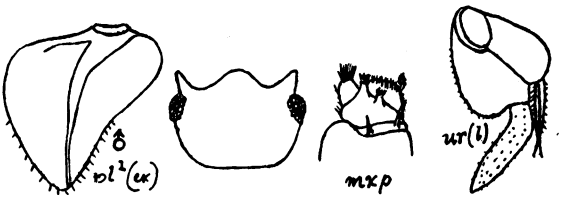

Fig. 118. *Alloniscus cornutus* Budde-Lund. Adapted from Budde-Lund, 1908*a*.

LOCALITY.—California, found with *A. perconvexus*. Two specimens, including the type, in the Copenhagen Museum (Budde-Lund). A variety (*lagunae*) was described from specimens obtained under old seaweed on the margin of a salt lagoon at Laguna Beach, California, by Stafford, 1913, but the supposed distinguishing characters of the variety are probably to be explained by the inadequate original description.

Alloniscus perconvexus Dana, 1856

Figures 119, 120

Alloniscus perconvexus DANA, 1856, p. 176 (orig. descr.).—STIMPSON, 1857, p. 506.—HARFORD, 1877, p. 54.—BUDDE-LUND, 1879, p. 1; 1885, p. 224.—UNDERWOOD, 1886, p. 360.—STEBBING, 1893, p. 431.—RICHARDSON, 1899, p. 864 (Ann. Mag. Nat. Hist., (7) IV, p. 332); 1900*a*, p. 305; 1905, p. 596 (descr.), Figs. 652–654.—BUDDE-LUND, 1908, p. 298, Pl. XV, figs. 48, 49.—STAFFORD, 1912, p. 124 (descr.), Fig. 69; 1913, p. 170.—ARCANGELI, 1932, p. 132.

Described by Dana as follows:

"Corpus valde convexum, subtilissime subgranulosum, fere laeve. Antennae externae subtiliter scabriculae, articulis tribus ultimis subaequis, articulo precedente non longioribus. Abdomen paulo transversum. Ramus terminalis styli caudalis basi brevior. Pedes infra spinulosi. Long. 6 1/2."

"Both the back and the legs in the specimens are brownish black. In some smaller specimens four to five lines long; the color is light brown, mottled with yellowish, and the legs are pale yellowish; the

form is a little more slender, and they may probably be a different species. The last three joints of the outer antennae are not so nearly equal."

Redescribed by Richardson, 1905, whose description is here quoted in part:

"Body ovate, very convex, not quite twice as long as broad, 9 mm.: 16 mm.

"Head twice as wide as long, 2 mm.: 4 mm., with the antero-lateral angles produced on either side into an acute process, "horn-like," situated just in front of the eye, and the front produced in the middle

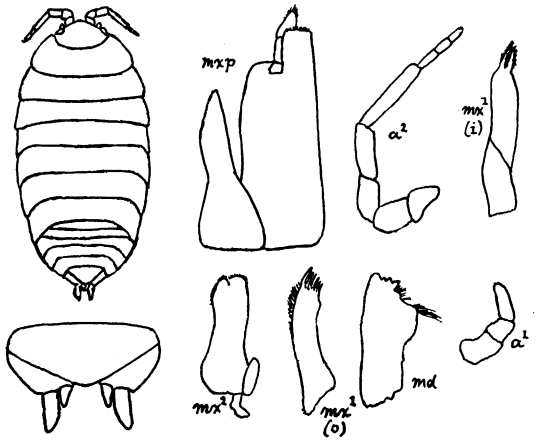

Fig. 119. *Alloniscus perconvexus* Dana. Adapted from Richardson, 1905.

in a large, widely rounded median lobe, extending as far as the lateral process. The eyes are small, oblong, composite, and situated in the antero-lateral angles of the head close to the lateral margins. The first pair of antennae are rudimentary and inconspicuous. They are composed of three small articles. The second pair of antennae have the basal article short; the second is about twice as long as the first; the third and fourth are subequal and each is a little longer than the second; the fifth is one and a half times as long as the fourth. The flagellum is composed of three subequal articles. The antennae are covered with small spines. The maxillipeds have a palp of three articles. The palp of the mandibles is wanting.

"The first segment of the thorax is 2 mm. in length and is a little longer than any of the others, which are subequal and each is about

1 1/2 mm. long. The lateral margins of all the segments are straight and contiguous. On the first four segments the epimera are indicated by a distinct longitudinal suture, which on the first segment is confined to the posterior half of the segment, but in the three following segments extends the entire length of the segment. There are no suture lines on the last three segments. . . . " (Richardson, 1905, pp. 596, 597.)

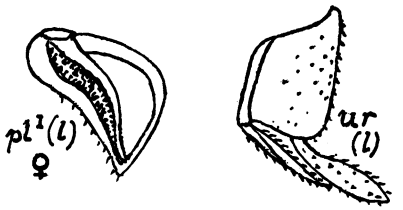

Fig. 120. *Alloniscus perconvexus* Dana. Adapted from Budde-Lund, 1908*a*.

LOCALITIES.—California (Dana, Budde-Lund); also Oregon. Richardson (1905) gives: Pacific Grove, Santa Barbara, and Monterey Bay in California, and Tillamook Head in Oregon; Stafford reports it from Laguna Beach, California, "Dug at mean tide mark from sandy shore." Budde-Lund says that the Copenhagen Museum has a few specimens. See also the remarks under *Ligidium gracile*.

Alloniscus mirabilis (Stuxberg), 1875

Alloniscus mirabilis BUDDE-LUND, 1879, p. 1; 1885, p. 229.—STEBBING, 1893, p. 431.—RICHARDSON, 1899, p. 864, (Ann. Mag. Nat. Hist., (7) IV, p. 332); 1900*a*, p. 305; 1905, p. 594 (descr.).—PRATT, 1935, p. 442.

Rhinoryctes mirabilis STUXBERG, 1875, p. 51 (orig. descr.).—UNDERWOOD, 1886, p. 363.

The following is Richardson's translation of the original description:

"Body oval, twice as long as wide, convex, very densely granulated; epimera serrate on the margins. Second pair of antennae much shorter than the width of the body (85:100); the fifth article of the peduncle very long, not very much curved, equal in length to the three articulate flagellum; the articles of the flagellum equal to each other in length or the middle one sometimes smallest.

"Eyes prominent, subcircular, with numerous ocelli.

"The frontal median lobe large, produced, obtuse, extended upward, equal to a fourth part of the width of the head; lateral lobes produced, conical, anteriorly rounded, equal to the eyes in length.

"All the segments of the thorax with the posterior margin sinuated

in the middle. Epimera moderately large, with the anterior angles gradually more rounded posteriorly, serrate, the posterior angles roundly acuminate not very much directed backward.

"Abdomen subcircular, a little wider than long, all the segments equal in length, the epimera of the first and second segments vanishing, those of the third, fourth, and fifth segments large, directed backward, rounded on the exterior margin, serrate, almost straight on the inner margin. The last segment is triangular, twice as wide as long, with the posterior margins straight, roundly acuminate, rather convex above and sometimes furnished with a longitudinal furrow not at all deep. The uropoda have the basal article almost as wide as long, depressed, with the post-lateral margin very little elevated, circularly rounded, serrate, the outer branch a little flattened, subconical, with the exterior margin straight, the inner margin convex, extending not much beyond the inner branch in length, which extends very little beyond the last segment of the abdomen.

"Color of the dorsal surface reddish or dark gray, the frontal lobes, especially the middle one, and a longitudinal band on the thorax darker and covered with very numerous paler oblong spots."

LOCALITY.—California.

Alloniscus compar Budde-Lund, 1893

Alloniscus compar BUDDE-LUND, 1893, pp. 124 (orig. descr.), 127.—DOLLFUS, 1893*a*, p. 345.

"Oblonge ovalis ve subovalis, convexiusculus; tota superficies minutissime et densissime punctata, sparse minute setigera; margo posterior omnium trunci et caudae segmentorum, segmento anali excepto, serie papillarum minutissimarum ornatus.

"Antennae dimidium corporis longitudine aequantes; scapi articuli tres priores inter se aequales, articulus quartus duobus praecedentibus simul subaequalis; flagellum triarticulatum; articulus primus secundo paulisper longior, tertius longissimus, a secundo obscure discretus.

"Processus frontales laterales mediocres, oblique rotundati; epistoma convexum, cum fronte paulum productum.

"Trunci segmentum primum margine posteriore curvato, segmenta duo sequentia subtransversa. Stria suturalis epimerorum segmentorum 2–3–4 nulla.

"Caudae segmentum anale triangulum, lateribus late incurvis, apice subobtuso, supra in medio paulisper excavatum, epimeras segmenti praeanalis tantum paulum superans. Segmenta 3–4–5 epimeris brevioribus.

"Color flavus, maculis e brunneo violaceis crebris, maxime in series quattuor longitudinales condensatis.

"Long. 4–4.5(5) mm. Lat. 2–2.2 mm." (Budde-Lund, 1893, p. 124.)

LOCALITIES.—La Moka and vicinity of Caracas, Venezuela, found with *Trichorhina ambigua* and *T. papillosa*.

Alloniscus borellii Dollfus, 1897

Figure 121

Alloniscus borellii DOLLFUS, 1897*c*, p. 3 (orig. descr.), Figs. 3*a*–3*e*.

"Corps assez convexe, ovale, lisse, avec de petits poils sétacés surtout sur les bords.

"Cephalon.—Front arrondi et un peu proéminent; lobes latéraux

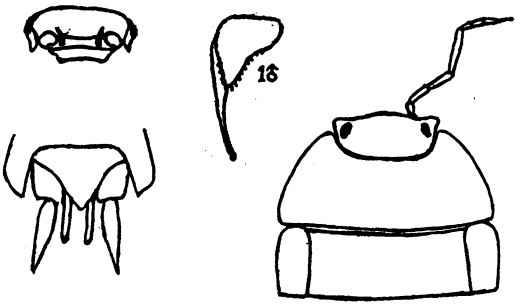

Fig. 121. *Alloniscus borellii* Dollfus. Adapted from Dollfus, 1897*a*.

infléchis de part et d'autres des yeux comme dans l'espèce précédente et dans la suivante (*A. argentinus*, *A. griseus*), et formant en avant un processus arrondi peu développé. Prosépistome muni d'un petit tubercle perliforme peu apparent; mesépistome bien développé. Yeux assez grands. Antennes à fouet tri-articulé, les deux premiers articles subégaux, et bien plus courts que le troisième.

"Pereion.—Premier segment à bord postérieur à peine sinueux de chaque côté; segments 2–4 munis d'un sillon coxal (chez la femelle seulement). Cinq derniers segments munis latéralement d'une petite granulation perliforme.

"Pleon, Telson.—Pleon en continuité avec le pereion. Pleotelson plus court que large, triangulaire à bords incurves, à sommet subaigu. Uropodes à base n'atteignant pas l'extremité du pleotelson; endopodite dépassant grandement le pleotelson, exopodite lancéolé, mediocre.

"Couleur.—Brun foncé, marbré et taché de clair: une tache

claire latérale plus accentuée bordée d'une ligne foncée: côtés plus clairs.

"Dimensions.—Long. 11 mm., larg. 5 mm."

LOCALITIES.—S. Lorenzo, Prov. Jujuy (first mentioned locality); vicinity of Salta; Estancia S. Felipe, Oran, both in Prov. of Salta in Argentina. Also Mission de Aguairenda and Caiza in the Chaco of Bolivia.

Alloniscus argentinus (Dollfus), 1894

Figure 122

Alloniscus argentinus DOLLFUS 1897*a*, p. 2 (descr.), Figs. 2*a*–2*c*.
Metoponorthus argentinus DOLLFUS, 1894, p. 3 (orig. descr.), 3 text figures.

"Corps ovale, assez convexe, lisse.

"Cephalon à bord frontal reporté sur la face inférieure ou il a refoulé l'épistome qui est très court. Yeux grands, environ 20 ocelles. Antennes?

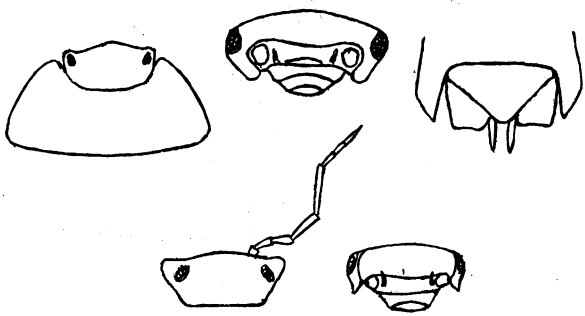

Fig. 122. *Alloniscus argentinus* (Dollfus). Adapted from Dollfus, 1894 (upper figures), and 1897*a* (lower figures).

"Pereion.—Premier segment à bord postérieur régulièrement courbé, sans la moindre sinuosité.

"Pleon, Telson.—Pleon en retrait peu sensible sur le pereion. Pleotelson triangulaire obtus, un peu incurvé sur les bords, plus large que long. Uropodes à base très développée, dépassant même un peu le sommet du pleotelson. Endopodites lancéolés étroits dépassant grandement le pleotelson. Exopodites?

"Couleur.—Gris-jaunatre, avec des stries et marbrures brunes, une strie latérale plus foncée que les autres. Pattes tachées de brun.

'Dimensions.—11 × 5 mm." (Dollfus, 1894, p. 3.)

Having later received additional specimens retaining their antennae, Dollfus (1897*a*, p. 2) places the species in *Alloniscus* instead of *Metopo-*

northus, gives additional figures and makes the following addition to the description.

"Antennes à fouet tri-articulé, les deux premiers articles du fouet subégaux, le dernier un peu plus long. Front normal et n'empiétant pas sur l'épistome; il n'en est séparé que par un très mince rebord apical. Prosépistome plan et sans tubercle médian; mésépistome très développé comme dans les espèces suivantes. Segments 2 à 4 du pereion présentant, chez la femelle seulement, un sillon coxal."

LOCALITIES.—Buenos Aires (first mentioned locality; no type locality named), Argentina: Rio Apa, Paraguay (Dollfus, 1894). No localities given for additional specimens described in 1897.

Alloniscus griseus Dollfus, 1897

Figure 123

Alloniscus griseus DOLLFUS 1897*a*, p. 3 (orig. descr.), Figs. 4*a*–4*e*.

"Corps ovale, presque lisse, très-finement ponctué-setacé, surtout sur les côtés.

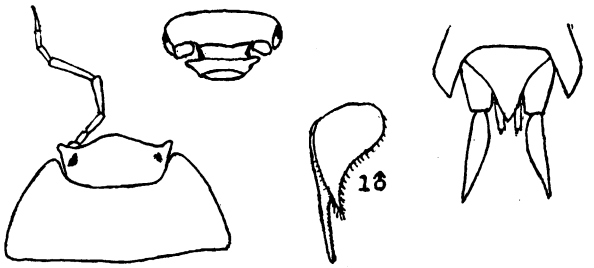

Fig. 123. *Alloniscus griseus* Dollfus. Adapted from Dollfus, 1897*a*.

"Cephalon.—Front proéminent et arrondi au milieu: lobes latéraux inflechis de part et d'autre des yeux, et formant antérieurement un processus triangulaire. Prosépistome plan: mésépistome bien développé. Yeux mediocres. Antennes à fouet tri-articulé; les deux premiers articles plus courts que le troisième.

"Pereion.—Premier segment à bord postérieur faiblement sinueux de chaque côté.

"Pleon, Telson.—En continuité avec le pereion; processus latéraux bien développés. Pleotelson aussi long que large, triangulaire à côtés incurvés, à sommet subaigu, avec une dépression médiane. Uropodes à base n'atteignant pas l'extremité du pleotelson, endopodite dépassant à peine le pleotelson, exopodite lancéolé, assez grand.

"Couleur.—Gris uniforme.

"Dimensions.—Long. 13 mm., larg. 6 1/2 mm."

LOCALITY.—Oran, Salta Province, Argentina. One male example (Dollfus).

Alloniscus species?

Alloniscus sp. RICHARDSON, 1913, p. 340.—PICADO, 1913, p. 337.

"One imperfect specimen was obtained at Patahaya (south of Cartago), Costa Rica. Collected by Mr. Picado." (Richardson.)

Richardson states elsewhere in the article that the specimens among which the present one was included were found on epiphytic bromeliads and were mostly collected at an altitude of 2000 to 2500 meters. Picado's reference applies to the same specimen as Richardson's.

SYNUROPUS RICHARDSON, 1901

"Body oval, not contractile into a ball, with the segments laterally expanded, as in *Oniscus*.

"Head with lateral and frontal lobes. Second pair of antennae long, with flagellum composed of three articles.

"Abdomen not narrower than thorax; pleural lamellae large.

"Terminal segment of body much broader than long, widely rounded posteriorly, not conically produced as in *Oniscus*. Basal joint of the uropoda large, broadly expanded inside, not oblong as in *Oniscus;* inner branches close together, their internal lateral margins contiguous. Inner branch inserted but little or scarcely at all in advance of the outer branch, situated close to the inner post-lateral angle of the peduncle. Outer branch somewhat longer than the inner branch." (Richardson, 1901, p. 563.)

The following is the type and only species. From the brief description and figures it would seem to be close to *Alloniscus*, if really separable from it.

Synuropus granulatus Richardson, 1901

Figure 124

Synuropus granulatus RICHARDSON, 1901, p. 563 (orig. descr.), Figs. 30, 31; 1905, p. 599 (descr.), Figs. 655, 656.

"Body oval, not able to be contracted into a ball, with the lateral parts of the segments expanded.

"Entire surface of body covered with small tubercles.

"Head deeply set in the first thoracic segment, the rounded anterior angulations of which reach the antero-lateral angles of the head. The

anterior margin of the head is produced in an obtusely pointed median lobe. The lateral lobes are very acute. The antennae are geniculate at the articulation of the fourth and fifth peduncular joints; the flagellum consists of three joints.

"The first thoracic segment is longest; the others are subequal. The abdomen is not narrower than the thorax. The first two segments have their lateral margins concealed. The three following have their lateral margins broadly expanded. The terminal segment is twice as broad as long, with the posterior margin broadly rounded. The basal joints of the uropoda are large, being partly covered by the terminal segment of the body. The outer branch is styliform and extends its entire length beyond the terminal abdominal segment. The inner

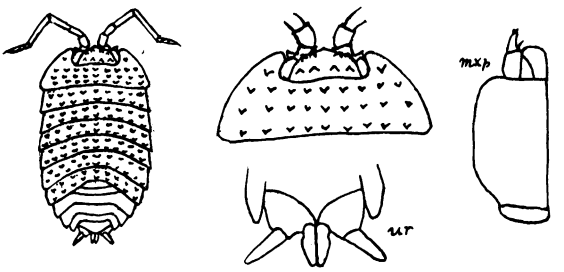

Fig. 124. *Synuropus granulatus* Richardson. Adapted from Richardson, 1901.

branches are situated close together in such a way that the inner lateral margins are contiguous throughout their length.

"The legs are ambulatory, similar, and subequal.

"Color brown, mottled with black." (Richardson, 1901, pp. 563, 564.)

Locality.—El Yunque, Puerto Rico, at an altitude of 2800 feet. Type in U. S. National Museum.

Arhina Budde-Lund, 1904

"Flagellum antennarum 3-articulatum. Pleurae capitis linea verticali utrinque decurrente discretae.

"Trunci segmentum primum post integrum. Pleopodum rami operculares omnium parium tracheis parvis instructi. Telsum breve triangulum, epimeris segmenti paenultimi paululum superans. Uropodes longiproducti; exopoditum longum sub-hastatum, apici scapi insertum, scapo multo plus duplo longius; endopoditum longum, scapo multo longius.

"Corpus leviter convexum aegre contractile. Oculi congregati, ocelli numerosi. Antennae mediocres, corpus dimidium subaequantis.

"Antennularum articulus 3. longius. Trunci segmenta pronotum satis magnum, tertiam partem dorsi segmenti aequans, et processum lateralem habens." (Budde-Lund, 1904, p. 44.)

A genus very closely related to *Alloniscus*, according to Jackson, 1928*a*, p. 582. Barnard, 1932, p. 232, considers it inseparable from that genus.

Arhina porcellioides Budde-Lund, 1904

Figures 125, 126

Arhina porcellioides BUDDE-LUND, 1904, p. 45 (orig. descr.), Pl. VI, figs. 1–17.
Arhina porcelloides JACKSON, 1928*a*, p. 582, Fig. 12.
Alloniscus cornutus KRAEPELIN, 1901, p. 204.
Not *Alloniscus cornutus* BUDDE-LUND, 1885, from California.

Budde-Lund's (1904) description is as follows:

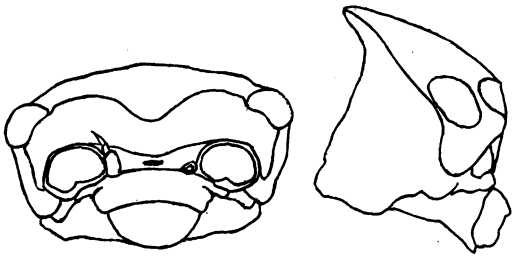

Fig. 125. *Arhina porcellioides* Budde-Lund. Adapted from Jackson, 1928*a*.

"Subovalis, convexiuscula, dense et minute granulata.

"Oculi majores: ocelli dense congregati, numero c. 20. Antennae dimidio corpore vix breviores (7:17); scapi articuli 1. et 2. breves, subglobosi, articulus 3. 2do vix longior et multo angustior, articulus 4. paulo longior quam 3. articulus 5. paululo brevior quam articuli 3. et 4. conjuncti; flagellum articulo 5. scapi longitudine subaequali, articuli inter se subaequales vel articulus 1. duobus sequentibus brevior. Frons ante linea obsoleta ab epistomata discreta in lateribus in tuberculositates producta, post lineam marginalem sulco leviore transverso impressa. Linea marginalis verticalis utrinque ad oculos producta, deinde in pleuras capitis decurrens. Epistoma angustius, convexiusculum, infra leviter transverse tumidum. Foramina antennarum magna, approximata; tubercula antennaria nulla. Clypeus fornicatus, lobis lateralibus nullis.

"Truncus segmenta omnia epimeris tenuibus integris; margo posterior segmenti 1. late curvatus, segmenti 2.–3.–4. leviter curvatus, subtransversus, utrinque vix conspicue incurvus; margo posterior segmenti 5.–6. leviter, 7. magis in medio incurvus; anguli posteriores segmenti 1.–2.–3. late rotundate obtusi, segmenti 4. subrecti, segmenti 5.–6. et maxime 7. acuti. Cauda: segmenta 1.–2. mediocria, segmenta 3.–4.–5. epimeris mediocribus; epimera segmenti 5. lata, angulo postico paulum extra verso valde divergentia. Telsum breve, triangulum, lateribus incurvis, epimera segmenti 5. paululum superans. Uropodes: Scapus oblique tetragonus, paulo latior quam longior, latere exteriore

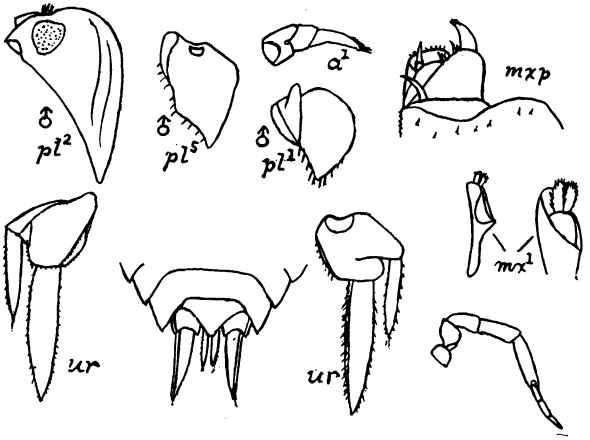

Fig. 126. *Arhina porcellioides* Budde-Lund. Adapted from Budde-Lund, 1904.

post excavato. Exopoditum longum, sub-hastatum; endopoditum longum, telsum satis superans.

"Subunicolor, grisea, in trunci segmentis utrinque macula rotunda pallidiore.

"Long. 7 mm. Lat. 4 mm."

DISTRIBUTION.—"Patria incerta, forsitan cosmopolita" (Budde-Lund). Found in warehouse at Copenhagen, perhaps imported from the East Indies, and in Hamburg Botanical Garden among plants from the West Indies.

Alloniscus cornutus Budde-Lund, with which (according to Budde-Lund, 1904, p. 46) this was incorrectly identified in Kraepelin's list, is a California species.

PORCELLIO LATREILLE, 1804

In the restricted sense employed in the present work, the members of this genus are of more or less depressed form with the lateral parts of the segments expanded, the head with median and lateral lobes well-developed, the eyes compound, the antennae with a flagellum of two articles only, and the abdomen not abruptly contracted. Branching tracheae, opening by a single orifice near the articulation of the plate are present in the external plates of the two or, rarely, three anterior pairs of pleopoda. See remarks under genus *Tracheoniscus*. There are a number of related groups sometimes treated as subgenera of *Porcellio*, sometimes as full genera; among these *Porcellionides* (see below) may be mentioned as very unsatisfactorily separated from *Porcellio* proper. The few true Porcellios found in America perhaps may have been accidentally introduced by man from Europe or North Africa, where the group has numerous representatives. Among them are two of the most abundant and familiar land isopods of the United States. Type of the genus, *P. scaber* Latreille.

Porcellio scaber Latreille, 1804

Figures 2, 3, 127A, 128

Philoscia tuberculata STIMPSON, 1856, p. 97.

Porcellio gemmulatus DANA, 1853, p. 725, Pl. XLVII, fig. 7.—STIMPSON, 1857, p. 506.—STUXBERG, 1875, p. 58.—UNDERWOOD, 1886, p. 362.

Porcellio montezumae SAUSSURE, 1857, p. 307 (brief descr.); 1858, p. 480 (descr.), Pl. V, fig. 41.—STUXBERG, 1875, p. 62.—BUDDE-LUND, 1879, p. 3; 1885, p. 130 (makes syn. of *scaber*).

Porcellio niger UNDERWOOD, 1886, p. 362.

Porcellio nigra SAY, 1818, p. 432.—GOULD, 1841, p. 337.—DE KAY, 1844, p. 52.

Porcellio scaber LATREILLE, 1804, 'Hist. Nat. des Crustacés et Insects,' VII, p. 45 (orig. descr.).—FITCH, 1855, p. 824; 1856, p. 121.—BUDDE-LUND, 1879, p. 3; 1885, p. 129 (descr.).—DOLLFUS, 1890, p. 66; 1896*d*, pp. 46, 48; 1897, p. 206.—MICHAELSEN, 1897, p. 128.—SARS, 1899, p. 176; Pl. LXXVII.—KRAEPELIN, 1901, p. 204.—RICHARDSON, 1901, p. 568; 1905, p. 621, Fig. 671.—RATHBUN, 1905, p. 45, check list, p. 4.—PAULMIER, 1905, p. 183, Fig. 56.—NORTON, 1909, p. 251.—THIELEMANN, 1910, p. 76.—FOWLER, 1912, p. 230 (descr.), Pl. LXIX.—RICHARDSON, 1912*c*, p. 29.—HUNTSMAN, 1913, p. 274.—PRATT, 1916, p. 380, Fig. 608.—ARCANGELI, 1914, p. 472.—VERHOEFF, 1917*a*, p. 221.—KUNKEL, 1918, p. 245 (descr.), Fig. 80.—WALLACE, 1919, p. 41.—WAHRBURG, 1922*a*, p. 286.—LONGNECKER, 1924, p. 197.—GANDARA, 1926, p. 285.—MOREIRA, 1927, p. 194.—JOHANSEN, 1929, p. 106.—BLAKE, 1930, p. 279; 1931, p. 352.—ARCANGELI, 1932, pp. 128, 129, Fig. 2.—MOREIRA, 1932, p. 430.—PROCTER, 1933, p. 248.—BIRSTEIN, 1933, p. 473.—PRATT, 1935, p. 441, Fig. 608.

The following may also be a synonym:

Porcellio cayennensis MIERS, 1877*a*, p. 667 (descr.), Pl. LXVIII, figs. 2–2*b*.—BUDDE-LUND, 1885, p. 131 (says perhaps a synonym of *scaber*).—VAN NAME, 1925, p. 466.

NOTE.—*Oniscus asellus* apparently is erroneously entered among the synonyms of this species by Underwood, 1886, p. 363.

"Body oblong oval, about twice as long as it is broad, dorsal face slightly convex and very rough, owing to the presence of numerous rounded tubercles. Cephalon with the lateral lobes rather large and rounded; frontal lobe less prominent, obtusely triangular. Side-plates of mesosome of moderate size, with the posterior corners acutely pro-

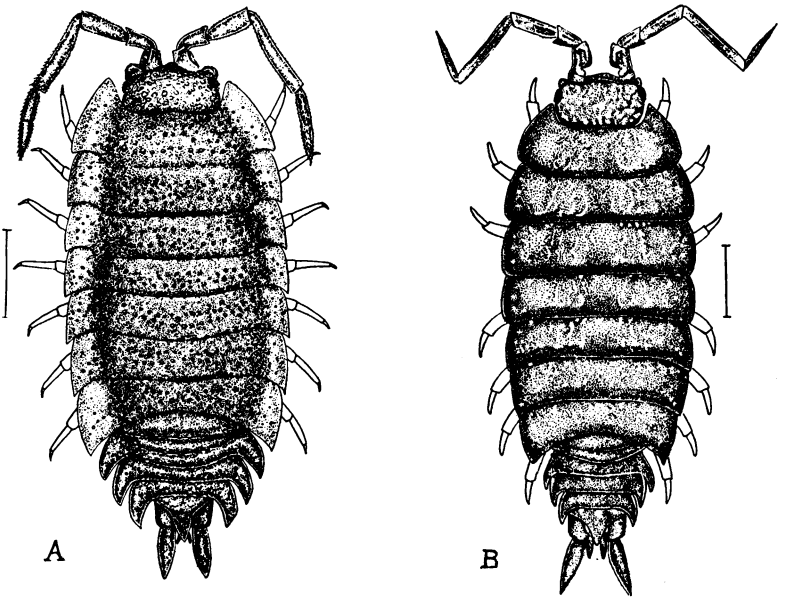

Fig. 127. A, *Porcellio scaber* Latreille. B, *Porcellionides pruinosus* (Brandt). After Paulmier, 1905.

duced. Metasome occupying about 1/4 of the length of the body, epimeral plates of 3rd to 5th segments strongly recurved; last segment rather produced, terminating in an acute point slightly grooved dorsally. Antennae less slender, scarcely attaining half the length of the body, flagellum about as long as the last peduncular joint, and having its 2 articulations of nearly equal size. Last pair of legs differing but little in the two sexes. Opercular plates of only the two anterior pairs of

pleopoda with air-cavities. Uropoda with the outer ramus broadly lanceolate, and comparatively larger in male than in female. Colour of dorsal face generally a uniformly grayish black; sometimes, however, lighter, and variegated with irregular dark patches, more rarely black, with the side-plates light yellowish. Length of adult female 14 mm." (Sars, 1899, pp. 176–177.)

This is the most conspicuously tuberculated of the Porcellios common in the United States.

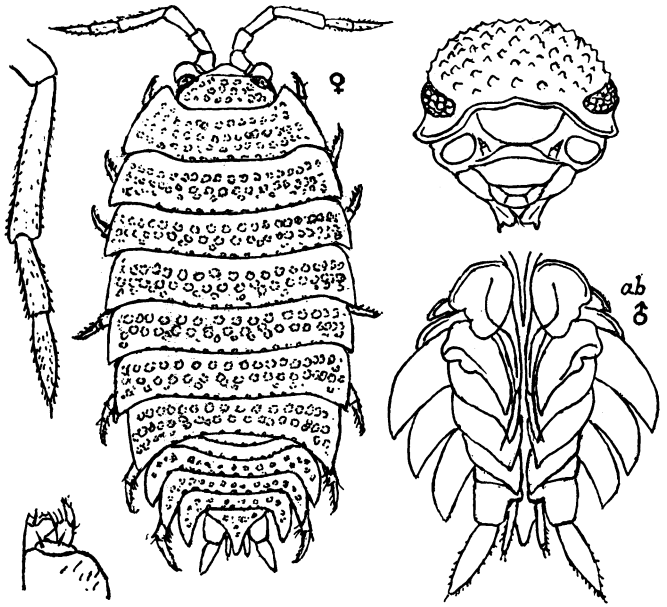

Fig. 128. *Porcellio scaber* Latreille. Adapted from Sars, 1899.

Two color varieties of this species were described by Brandt and Ratzeburg (Medizinische Zoologie, II, 1830–1834, p. 77), var. *marmoratus* "e testaceo flava vel e sordido flava vel uniformis vel maculis punctisque nigris conspersa," and var. *marginata* "nigra, pulcherrime flavo vel rufo limbata."

DISTRIBUTION.—A native of Europe that has followed human settlements throughout the greater part of the world, though apparently more at home in temperate than in hot regions, which, however, it has invaded to some extent. It is one of the commonest isopods in the northern half of the United States and is reported from eastern Mexico,

in low altitudes near Cordova, State of Vera Cruz, and in higher altitudes at "Tusitlan" (Tezuitlan, State of Puebla) by Saussure under the name *P. montezumae*, and if *P. cayennensis* Miers is a synonym, from Cayenne, Bogota, and other localities in Colombia in altitudes of 1800 to 2750 meters (examples of vars. *marmoratus* and *marginatus* also obtained at these localities); St. Croix, W. I.; Galapagos (Thielemann, 1922); Bermuda; Juan Fernandez (Dollfus, 1890; Arcangeli, 1914; Wahrburg, 1924); São Paulo, Brazil (Moreira, 1932). There are records from Greenland, Alaska, and various parts of Canada including Prince Edward Island (Johansen, 1929), all of which however are from either the eastern or the Pacific coastal regions or near the Great Lakes or St. Lawrence River.

Porcellio scaber variety **americanus** Arcangeli, 1932

Arcangeli, 1932, p. 128, expresses the opinion that this species is endemic in the North American Pacific coast region and describes and figures (*loc. cit.*, Fig. 3) specimens from that region as a variety (var. *americanus*).

Porcellio laevis Latreille, 1804

Figure 129

Porcellio aztecus Saussure, 1857 (brief descr.), p. 307; 1858, p. 479 (descr.), Pl. v, fig. 38.—Stuxberg, 1875, p. 62.—Miers, 1877*a*, p. 669.

Porcellio cinerascens Brandt, 1833, p. 178 (descr.).—Milne-Edwards, 1840, p. 170.—Stuxberg, 1875, p. 43.

Porcellio cotillae Saussure, 1857, p. 307 (brief descr.); 1858, p. 478 (descr. name misprinted *cotillai*), Pl. v, fig. 37.

Porcellio cubensis Saussure, 1857, p. 307 (brief descr.); 1858, p. 477 (descr.), Pl. v, fig. 35.—Miers, 1877*a*, p. 668.

Porcellio dubius Brandt, 1833, p. 178.—Milne-Edwards, 1840, p. 170.—Stuxberg, 1875, p. 58.—Underwood, 1886, p. 362.

Porcellio laevis Latreille, 1804, 'Hist. Nat. des Crustacés et Insects,' VII, p. 46 (orig. descr.).—Budde-Lund, 1879, p. 3; 1885, p. 138 (descr.).—Dollfus, 1890, p. 66.—Dahl, 1892, p. 110.—Dollfus, 1893*a*, pp. 341, 344; 1894, p. 3; 1896*d*, p. 46; 1897, p. 207.—Hansen, 1897, p. 124.—Sars, 1899, p. 181 (descr.), Pl. lxxix, fig. 2.—Kraepelin, 1901, p. 204.—Richardson, 1902, p. 301.—Budde-Lund, 1904, p. 120.—Verrill, 1902, p. 844, Fig. 232*a*.—Richardson, 1905, p. 614 (descr.), Fig. 666; 1912, Proc. U. S. Nat. Mus., XLII, p. 192.—Fowler, 1912, p. 231 (descr.), Pl. lxx.—Pratt, 1916, p. 380.—Popenoe, 1917, p. 10, Fig. 7.—Verhoeff, 1917*a*, p. 221.—Pearse, 1917, p. 7.—Wahrberg, 1922, p. 286.—Van Name, 1924, p. 185.—Gandara, 1926, p. 285.—Johansen, 1926, p. 166.—Walker, 1927, p. 173.—Moreira, 1927, p. 194.—Giambiagi, 1931, p. 420, Pls. iv, v.—Boone, 1934, p. 569.—Moreira, 1932, p. 430.—Pratt, 1935, p. 441.

Porcellio mexicanus Saussure, 1857, p. 307 (brief descr.); 1858, p. 479 (descr.), Pl. v, figs. 39, 40.—Stuxberg, 1875, p. 62.—Miers, 1877*a*, p. 669 (makes syn. of *P. aztecus*).

Porcellio parvicornis RICHARDSON, 1902, p. 302 (descr.), Pl. XL, fig. 57.—VERRILL, 1902, p. 844, Fig. 230.—RICHARDSON, 1905, p. 616 (descr.), Fig. 667.—VERHOEFF, 1907, p. 232 (says based on young *laevis*); 1917*a*, p. 221.—BOONE, 1921, p. 98.

Porcellio poeyi GUERIN, 1837, p. 132 (orig. descr.).—SAUSSURE, 1857, p. 307 (brief descr.); 1858, p. 477, Pl. v, fig. 34.

Porcellio sumichrasti SAUSSURE, 1857, p. 307 (brief descr.); 1858, p. 478, Pl. v, fig. 36.—MIERS, 1877*a*, p. 668.

The following are also probably to be regarded as synonyms:

Porcellio chilensis NICOLET, 1849, p. 272 (orig. descr.).—STUXBERG, 1875, p. 43.—BUDDE-LUND, 1879, p. 3; 1885, p. 141 (says perhaps not distinct from *laevis*). (Not *P. chilensis* Dana, 1853.)

LOCALITY.—Chile.

Porcellio formosus STUXBERG, 1875, p. 57 (orig. descr.).—BUDDE-LUND, 1885, p. 141 (says perhaps not distinct from *P. laevis*).—UNDERWOOD, 1886, p. 362.—RICHARDSON, 1899, p. 862 (Ann. Mag. Nat. Hist., (7) IV, p. 329); 1900*a*, p. 304; 1905, p. 612 (descr.).—VERHOEFF, 1917*a*, p. 221.—PRATT, 1925, p. 441.

LOCALITIES.—San Pedro and San Francisco, California. See also under *Porcellionides virgatus*.

Porcellio gayi NICOLET, 1849, p. 272 (orig. descr.).—STUXBERG, 1875, p. 44.—BUDDE-LUND, 1879, p. 3; 1885, p. 141 (says perhaps not distinct from *laevis*).

LOCALITY.—Chile.

Porcellio interruptus HELLER, 1861, p. 497 (orig. descr.); 1868, p. 136 (descr.), Pl. XII, fig. 6.—STUXBERG, 1875, p. 44.—MIERS, 1877, p. 669.—BUDDE-LUND, 1885, p. 140 (considers probably immature of *laevis*). (Not *P. interruptus* Koch, 1841.)

LOCALITY.—Chile.

Porcellio pulcher NICOLET, 1849, p. 271 (orig. descr.).—STUXBERG, 1875, p. 44.—BUDDE-LUND, 1879, p. 3; 1885, p. 141 (says perhaps not distinct from *laevis*).

LOCALITY.—Chile, in damp places.

See also under syns. of *Cylisticus convexus*.

"Body oval, greatest width slightly exceeding half the length, dorsal face moderately convex and almost perfectly smooth. Cephalon with the lateral lobes well developed, rounded, frontal lobe obtusely triangular. Side-plates of mesosome subcontiguous, 1st pair considerably larger than the succeeding ones, which have the posterior corners but slightly produced. Metasome not nearly attaining 1/4 of the length of the body, epimeral plates of 3rd to 5th segments of moderate size and slightly recurved; last segment subtriangular, outer part acutely pro-

duced and slightly grooved above. Antennae very slender, equalling half the length of the body, flagellum not attaining the length of the last peduncular joint, and having the proximal articulation somewhat longer than the distal one. Last pair of legs differing but little in the two sexes. Opercular plates of only the 2 anterior pairs of pleopoda with air-cavities. Uropoda with the outer ramus in male nearly twice as long as in female. Colour of dorsal face leaden gray, the segments of mesosome having on each side of the median line an assemblage of lighter, wavy stripes; lower face and legs pale yellowish. Length of adult male reaching to 15 mm." (Sars, 1899, pp. 181, 182.)

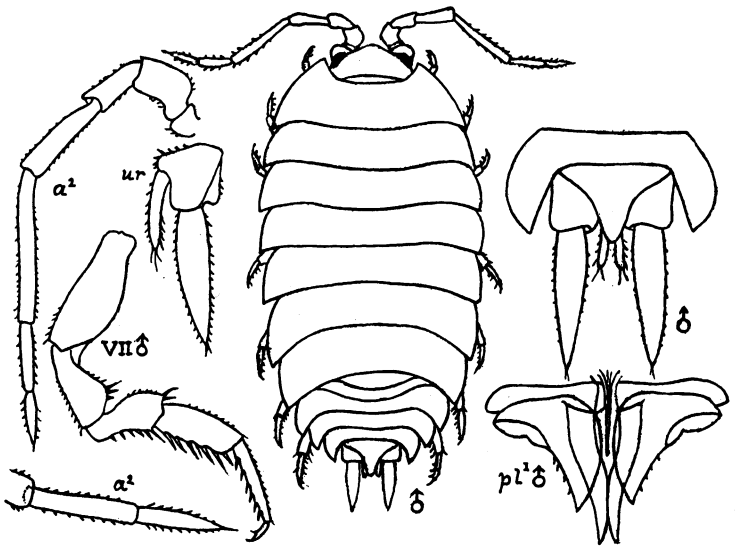

Fig. 129. *Porcellio laevis* Latreille. Adapted from Sars, 1899.

This is an Old World species that has followed human settlements throughout a large part of the world, especially in warm and warm-temperate regions, though also to a less extent in cooler latitudes. It is so widely distributed in South America, except the most southern part, Central America, Mexico, the West Indies and the southern and especially in the southwestern parts of the United States, north at least to northern-central California, southern Ohio, and the vicinity of New York City, that the mention of specific localities seems hardly needed here. It is found also at Bermuda, the Galapagos (Hansen, 1897), Juan Fernandez (Wahrberg, 1922), as well as at Hawaii. There are no

Canadian records that I know of. Richardson (1899, 1905) gives one from Unalaska, Aleutian Ils., which is so far north that a confirmation of the record would be desirable.

If not already established in America before the advent of white settlers, it must have been one of the first foreign species to become so, arriving with the early Spanish colonists.

Porcellio spinicornis Say, 1818

Figure 130

Porcellio mixtus Fitch, 1855, p. 824 (descr.); 1856, p. 120.—Underwood, 1886, p. 362.

Porcellio pictus Stuxberg, 1875, p. 59.—Budde-Lund, 1879, p. 3; 1885, p. 123.—Sars, 1899, p. 177 (descr.), Pl. lxxviii, fig. 1.—Verhoeff, 1917*a*, p. 221.—Blake, 1931, p. 352.

Porcellio spinicornis Say, 1818, p. 431 (orig. descr.).—De Kay, 1844, p. 51.—Stuxberg, 1875, p. 55.—Budde-Lund, 1885, p. 124 (doubtfully distinguished from *pictus*).—Stoller, 1902, p. 213.—Richardson, 1905, p. 619, Fig. 669.—Rathbun, 1905, p. 46, check list, p. 4.—Fowler, 1912, p. 518.—Kunkel, 1918, p. 243, Fig. 79.—Johansen, 1926*b*, p. 166.—Walker, 1927, p. 179.

See also *Porcellio limatus* Fitch, under syns. of *Oniscus asellus*.

"Body oblong oval, and considerably depressed, with the face rough owing to the presence of small elevated tubercles, less densely crowded than in *P. scaber*. Cephalon with the lateral lobes very large and slightly curved outwards, frontal lobe less prominent, and broadly rounded. Side-plates of mesosome well developed, with the posterior corners acuminate. Metasome scarcely attaining 1/4 of the length of the body, epimeral plates of 3rd and 5th segments prominent, recurved; last segment considerably produced, being almost as long as it is broad at the base, terminal part acute and slightly grooved above. Antennae rather slender, nearly half as long as the body, 2nd and 3rd joints of the peduncle carinated outside, the carina being in each of the joints produced at the end to a dentiform projection; flagellum not attaining the length of the last peduncular joint, and having its proximal articulation nearly twice as long as the distal one. Last pair of legs in male more strongly built than in female, with the carpal joint considerably dilated. Opercular plates of the 2 anterior pairs of pleopoda with very distinct air-cavities. Uropoda with the outer ramus rather broad, and considerably larger in male than in female. Colour of dorsal face yellowish grey, variegated with dark brown patches, which are generally arranged in 5 longitudinal series on the mesosome; cephalon and middle part of metasome uniformly blackish. In fresh specimens, moreover, a double row of very conspicuous light yellow patches occurs along the middle of the

mesosome, caused by some opaque matter lying beneath the skin (renal excretions). Length of adult female reaching to 14 mm.

"Remarks.—The present species may be easily recognized by the comparatively greatly depressed body, the broadly rounded frontal lobe, the slender antennae, and the peculiar colouring of the dorsal face. In fresh specimens, the above-mentioned opaque patches along the dorsal face of the mesosome are very conspicuous, and may at once suffice for distinguishing this species from its allies. The extent of the dark

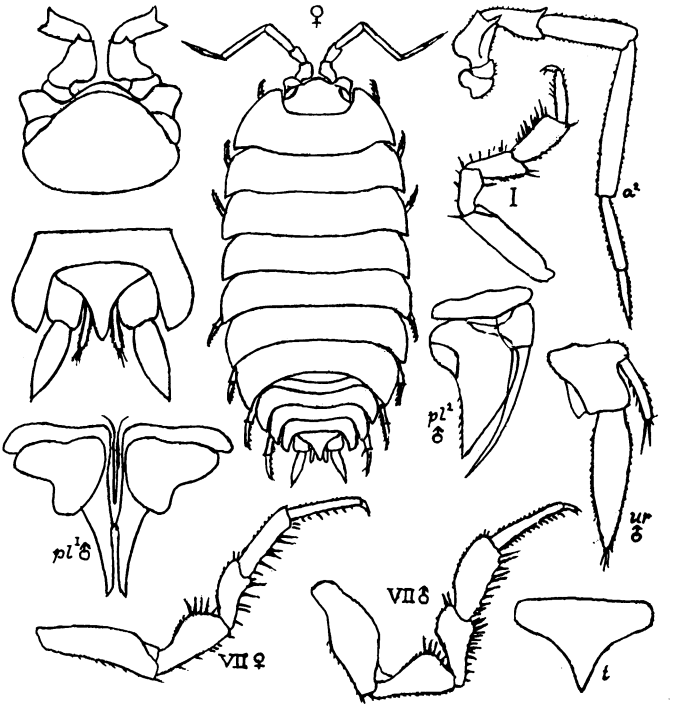

Fig. 130. *Porcellio spinicornis* Say. Adapted from Sars, 1899.

patches is, on the other hand, rather variable; but in all the specimens the cephalon and the middle part of the metasome exhibit a uniformly dark colour, and this has, indeed, given rise to the specific name, *melanocephalus*, proposed by Koch for this species." (Sars, 1899, pp. 177, 178.)

Distribution.—Common and widely distributed in northern and central Europe and established in northeastern North America, where

it has been recorded from New York State (Niagara and Schenectady), and Connecticut (Goshen and New Haven); Johansen, 1926, and Walker, 1927, give localities in southern Ontario and Quebec. The American Museum of Natural History has specimens from Saugerties, New York. "Found in the crevices of rocks and on shady limestone ridges" (Stoller).

Porcellio pubescens Dollfus, 1893

Figure 131

Porcellio pubescens DOLLFUS, 1893*a*, p. 341 (orig. descr.), Pl. x, figs. 7*a*–7*c*.

"Corps assez étroit, peu convexe, lisse et pubescent.

"Cephalon.—Lobe frontal médian largement triangulaire, lobes latéraux quadrangulaires, arrondis. Prosépistome très développé, muni d'un tubercule perliforme très net. Antennes atteignant la moitié du corps, premier article du fouet quatre fois plus court que le second.

Fig. 131. *Porcellio pubescens* Dollfus. Adapted from Dollfus, 1893*a*.

"Perion.—Bord postérieur non sinueux.

"Pleon, Telson.—Parties latérales des somites du pleon assez divergents. Pleotelson aussi long que large, triangulaire, à côtés incurvés. Uropodes à base très développée, surtout du côté interne; endopodite implanté très en arrière et dépassant l'extrémité du pleotelson.

"Couleur.—D'un fauve clair, avec marbrures et taches brunes, formant trois bandes longitudinales, une médiane et deux latérales. Dans les exemplaires de la Colonie Tovar, la bande médiane est découpée et les côtés du pleon restent clairs.

"Dimensions.—8 × 3 1/2 mill." (Dollfus, 1893.)

LOCALITIES.—Petare, Venezuela, 5 female specimens; Colonie Tovar, Venezuela, 6 female specimens.

Porcellio granarus Nicolet, 1849

Porcellio granarus NICOLET, 1849, p. 273 (orig. descr.).—MIERS, 1877*a*, p. 669.—BUDDE-LUND, 1879, p. 3; 1885, p. 149.

Porcellio granurus STUXBERG, 1875, p. 44.

"P. fusco; corpore elongato, granario; antennis exterioribus gracilibus, latis, lateralibus minimis; abdomine brevi, segmento ultimo trianguliformi."

"Body narrow, elongate and finely granulated, head scarcely set back into the concavity of the thorax, which is of little depth; forehead wide, almost straight and very abrupt, lateral lobes very small, not directed forward, lying against the sides of the head; antennae slender with the sixth article longer than the seventh; lateral plates of the body segments short, little rounded and almost squarely truncate; abdomen very short with the segments subequal; narrower than the thorax and terminating in a triangular point without exceeding the basal article of the last pair of appendages; legs without spines except for some hair-like ones. Color light brown with the lower side of the body and the legs pale yellow. Length, 5 lines; width, 2.5 lines." (Translated from original description.)

LOCALITY.—Chile, found with *P. gayi* (the latter a probable syn. of *P. laevis*).

Porcellio liliputanus Nicolet, 1849

Porcellio liliputanus NICOLET, 1849, p. 273 (orig. descr.).—MIERS, 1877*a*, p. 669.—BUDDE-LUND, 1879, p. 3; 1885, p. 149.

Porcellio triliputanus STUXBERG, 1875, p. 44, (also *trilipatanus*)

"P. fusco; corpore ovato, convexo, tenuissime punctato; lobis lateralibus capitis minutissimis."

"Body oval, very convex and finely punctated, head wide, subglobose, with the forehead very much inclined and rounded at the top; lateral lobes very small and insignificant, and directed downward; sixth article of the antennae much shorter than the seventh; abdomen very short; the first five segments short and equal, terminated laterally by narrow prolonged plates, acute and directed backward; the last segment is large, triangular and longer than the basal article of the last pair of appendages. Color dark brown. Length, 2 lines; width, 1 line." (Translated from original description.)

LOCALITY.—Chile, in damp places.

SUBGENUS **PROPORCELLIO** VERHOEFF, 1917

A subdivision of *Porcellio* (see Verhoeff, 1917*a*, p. 214) comprising a few species of the Mediterranean region which approach *Porcellionides* in some respects.

Porcellio (Proporcellio) quadriseriatus Verhoeff, 1917

Figure 132

Porcellio (Proporcellio) quadriseriatus VERHOEFF, 1917, Jahresh. vat. nat. Ver. Wuerttemburg, LXXIII, p. 167 (orig. descr.).—GEISER, 1933, p. 29; 1934, p. 9.

See also remarks under synonymy of *Philoscia muscorum*.

The body is of somewhat elongate oval form and only moderately arched. The first three thoracic segments have the rear lateral angles rounded off to a successively diminishing extent; segment IV is the first one in which that angle is noticeably produced backward. The two or

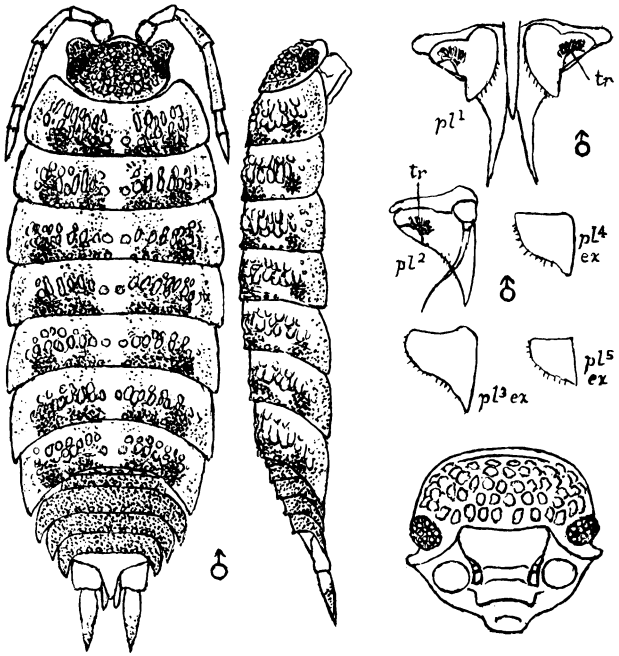

Fig. 132. *Porcellio (Proporcellio) quadriseriatus* Verhoeff.

three anterior segments, but especially segment I, have the lateral margin very slightly and narrowly rolled or turned outward. The general surface is somewhat tuberculate or rugose, in addition to which magnification shows the surface to be covered with minute rounded granules and scattered minute backwardly directed setae. The head is quite rough with numerous small, low rounded tubercles; these occur also on the thoracic segments, where, however, they become more or less confluent into low rugae; they are somewhat less numerous and conspicu-

ous on the posterior than on the more anterior segments, and are wanting on the abdomen. On both abdomen and thorax there are small, inconspicuous rounded tubercles in a row along the rear border of the segments. The telson is smooth but exhibits a slight median depression.

The front margin of the head exhibits prominent downwardly inclined lateral lobes which are rounded in front; between them the outline is that of a very wide obtuse triangle. The upper margin of the epistome is distinct and upturned, below it the epistome is smoothly convex.

The eyes are prominent with about eighteen well-formed ocelli, the antennae fairly long, with their segments of four-angled, slightly furrowed cross section, and with the two articles of the flagellum usually not far from equal in length or the proximal article more or less noticeably shorter, especially in young individuals.

There are sexual differences in the first three pairs of legs, those of the male having brush-like areas of slender spines on the carpus and merus; the males also have the external branches of the uropoda, and to some extent the basal segments also, longer than in the females.

The coloration of these specimens is striking. The head is dark purplish brown with numerous small light spots, the abdomen, except the telson, is also almost uniformly dark. The telson and the uropoda (except the tips of the external branches) are light, in most specimens practically entirely unpigmented, contrasting conspicuously with the dark abdominal segments. The thoracic segments each have a fairly large conspicuous dark spot on the rear basal part of each epimeron and a transversely extended dark area on the rear part of each segment on each side of the median line. The other parts of these segments are mainly light (unpigmented) or slightly clouded or marbled with the purplish brown, so that the thorax also appears light in contrast with the dark head and abdomen. Legs and under parts practically unpigmented.

Length, 6 to 7 mm.

Locality.—Dallas, Texas, collected in large numbers, May 15 to June 1, 1932, in the greenhouse of the Southern Methodist University in traps with potato as bait, in company with *Porcellionides pruinosus* and *Porcellio laevis*, by Prof. S. W. Geiser. Some of these specimens, donated by Prof. Geiser, are in the American Museum of Natural History.

This is a species of the Old World not previously reported from America. Specimens of it were kindly identified for me by Prof. Ar-

cangeli of Turin, Italy. The type locality of the species is near Jaffa, Palestine, but Prof. Arcangeli states in his letter that he considers several other forms described from Greece, Sicily, and southern France as synonyms or varieties of it, so that the country from which it was imported is uncertain.

GENUS OR SUBGENUS **PORCELLIONIDES** MIERS, 1877

(Syn. *Metoponorthus*, Budde-Lund, 1885)

Typical species of this group differ considerably in appearance from typical members of *Porcellio* in having a narrower, usually somewhat less depressed body, the frontal and lateral lobes of the head much less developed, the thoracic epimera less expanded and the abdomen smaller and more abruptly contracted, yet, as pointed out by Verhoeff (1907*a*, p. 241; 1917*a*, p. 215), there are no characters of real importance separating the two groups, which, moreover, are connected by many intermediate species. However, this group has been generally accorded generic rank, and until further study can be made of the many insufficiently known American species of this section of the family, the adoption of any innovation in their classification would be premature, and probably would result in more inconvenience than advantage. An additional reason for caution in this matter is that some of the species may prove to belong in *Tracheoniscus* (see below) rather than in *Porcellio*.

Porcellionides pruinosus (Brandt), 1833

Figures 127B, 133, 134A

Metoponorthus pruinosus BUDDE-LUND, 1879, p. 4; 1885, p. 169 (descr.).—DOLLFUS, 1893*a*, pp. 342, 344 (*Mesoponorthrus* and *Metopoporthrus*).—BUDDE-LUND, 1893, p. 118.—STEBBING, 1893, p. 429.—DOLLFUS, 1894, p. 3; 1896*b*, p. 2; 1897*a*, p. 2; 1897, p. 209 (*Metoponosthus*).—SARS, 1899, p. 184 (descr.), Pl. LXXX, fig. 2.—RICHARDSON, 1901, p. 569.—KRAEPELIN, 1901, p. 204.—STOLLER, 1902, p. 213 (*Metopnorthus*).—VERRILL, 1902, p. 845.—RICHARDSON, 1902, p. 302; 1905, p. 627, Fig. 674.—PAULMIER, 1905, p. 183, Fig. 57.—RICHARDSON, 1910*a*, p. 95.—FOWLER, 1912, p. 517.—PRATT, 1916, p. 380, Fig. 609.—PEARSE, 1917, p. 7; 1921, p. 460.—KUNKEL, 1918, p. 247 (descr.), Fig. 82.—LONGNECKER, 1924, p. 198.—WALKER, 1927, p. 177.—GIAMBIAGI, 1931, p. 422, Pl. VI.—VERHOEFF, 1933, p. 106.

Metoponorthus schwencki MOREIRA, 1927, p. 145, Figs. 4–6.—SCHWENCK, 1927, p. ?, Figs. 7, 8, 10.—MOREIRA, 1932, p. 430 (*schwenki*, *schwenski*), Pl. III.

Porcellio immaculatus FITCH, 1855, p. 824; 1856, p. 120.—UNDERWOOD, 1886, p. 362.

Porcellio maculicornis STUXBERG, 1875, p. 55.—UNDERWOOD, 1886, p. 362.

Porcellio pruinosus BRANDT, 1833, p. 19 (orig. descr.).

Porcellio (*Porcellionides*) *pruinosus* ARCANGELI, 1930*a*, p. 3.

Porcellio (*Porcellionides*) *flavo-vittata* MIERS, 1877*a*, p. 669 (descr.), Pl. LXVIII, figs. 4–4*b*. See Budde-Lund, 1885, p. 171 (*P. flavo-vittatus*).

Porcellionides pruinosus RICHARDSON, 1912, p. 192.—PICADO, 1913, p. 337.—RICHARDSON, 1912*c*, p. 30 (*Procellionides*) COLLINGE, 1915, p. 509.—VAN NAME, 1924, p. 197, Fig. 19; 1925, p. 465; 1926, p. 2.—BLAKE, 1931, p. 353.

The following form is also perhaps a synonym:

Porcellio (*Porcellionides*) *jelskii* MIERS, 1877*a*, p. 668 (descr.), Pl. LXIII, figs. 3–36.

Porcellionides jelskii BUDDE-LUND, 1885, p. 170 (doubtful syn. of *pruinosus*).—VAN NAME, 1925, p. 465 (doubtful syn. of *pruinosus*).

See also *Porcellionides bermudezi* Boone, 1934, and *P. chilensis* (Dana), 1853.

"Body oblong, more than twice as long as it is broad, dorsal face but slightly convex and nearly smooth, though, on a closer examination,

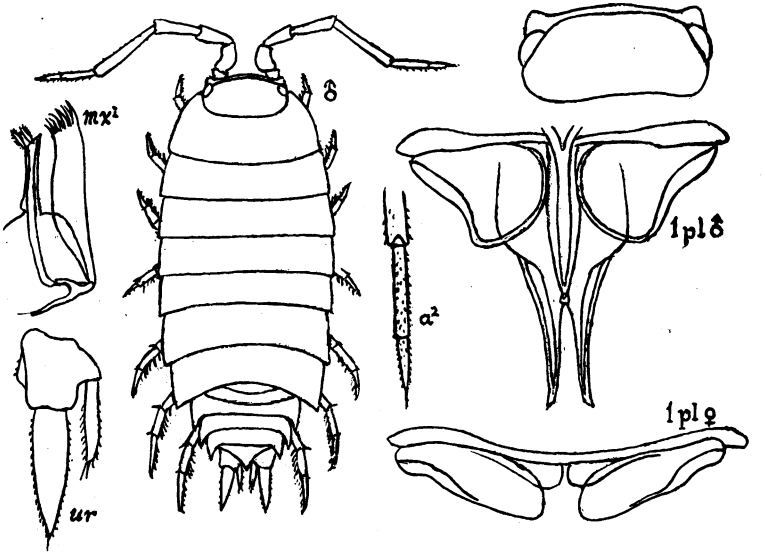

Fig. 133. *Porcellionides pruinosus* (Brandt). Adapted from Sars, 1899.

exhibiting a very fine granulation. Cephalon transversely quadrangular, almost twice as broad as it is long, lateral lobes extremely small, frontal margin straight. Side-plates of the 4 anterior segments of mesosome scarcely at all projecting, those of the 3 posterior segments somewhat larger, with the posterior corners obtusely acuminate. Metasome not attaining 1/4 of the length of the body, and much narrower than the mesosome, epimeral plates of the 2 anterior segments concealed, those of 3rd to 5th segments comparatively small, recurved; last segment nearly twice as broad at the base as it is long, subtriangular, tip pointed. An-

tennulae with the last joint scarcely longer than the middle one. Antennae very slender and elongated, exceeding half the length of the body, flagellum somewhat shorter than the last peduncular joint, and having its proximal articulation nearly twice as long as the distal one. Legs very slender, minutely spinulose inside, propodal joint narrow, sublinear. Opercular plates of only the 2 anterior pairs of pleopoda provided with air-cavities, and of somewhat different shape in the two sexes. Uropoda with the outer ramus nearly twice as long as the basal part, inner ramus extending scarcely to the middle of the outer. Colour of dorsal face light reddish brown, the segments of mesosome being bordered behind with darker brown, and having on each side of the median line a group of lighter dots or stripes; antennae banded with white. Length of adult female 9 mm." (Sars, 1899, pp. 184, 185.)

The statements in the above description of Sars, in my opinion, should have some qualification, as the thoracic segments exhibit quite noticeable, though very small, slightly elevated tubercles arranged in more or less distinct transverse rows, one of them along the rear edge of each segment.

The unusual length of the first article of the antennal flagellum compared to the terminal one affords great help in recognizing this species. See Figure 134A.

DISTRIBUTION.—A species of European origin that is now found about human settlements in most parts of the world, in warm as well as temperate climates. Widely distributed in settled places in South America (except perhaps in the extreme south), Central America, Mexico, and the West Indies. It occurs at Bermuda and the Galapagos Islands. The American Museum collection contains specimens from the St. Andrews Islands, Colombia, and from localities on the following West Indian Islands: New Providence, Andros, Turk's, Puerto Rico, Culebra, Mona, Desecheo, Jamaica, Cuba, and Dominica. It has also been recorded from St. Croix and St. Thomas. Richardson, 1912*c*, reports it from localities in Colombia from 1547 to 1820 meters in altitude; and Stebbing, 1893, from Equador at the great altitude of 13,300 feet.

In North America it ranges clear across the United States to the Pacific coast, but Walker, 1927, states that there is only one Canadian record (Lake Simcoe, Ontario).

Porcellionides sexfasciatus (Koch), 1847

Figure 134B

Metoponorthus sexfasciatus BUDDE-LUND, 1885, p. 167 (descr., no American

locality given).—DOLLFUS, 1890, p. 4.—DAHL, 1892, p. 110.—RICHARDSON, 1902, p. 302.—VERRILL, 1902, p. 844.—RICHARDSON, 1905, p. 629 (descr.).

Porcellio sexfasciatus KOCH, 1847, p. 208 (orig. descr.), Pl. VIII, fig. 99.—ARCANGELI, 1932*b*, p. 229.

Porcellionides sexfasciatus ARCANGELI, 1925, p. 42; 1930, p. 88.

Best distinguished from *pruinosus* by the antennae, which are proportionately very slightly shorter and have the two articles of the flagellum nearly equal, the proximal one being just perceptibly longer, and by the color markings. In this species the markings of the dorsal surface form somewhat interrupted, but often conspicuous, light and dark longitudinal stripes, while the general color in *pruinosus* is very uniform. The present species, if the few specimens at hand give sufficient indication, is somewhat smoother than *pruinosus*, and each thoracic

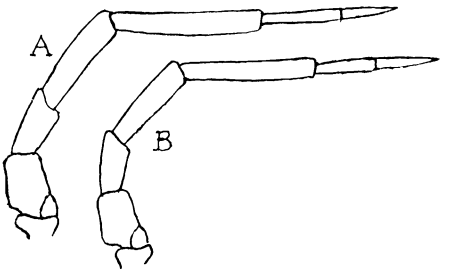

Fig. 134. A, antenna of *Porcellionides pruinosus* (Brandt); B, *Porcellionides sexfasciatus* (Koch).

epimeron bears, posterior to its center, a low and small, but nevertheless fairly noticeable, tubercle. Budde-Lund, 1885, mentions a small difference in the number of penicilli on the inner mala of the mandible: three to four in *sexfasciatus;* four to five (on the left mandible) six in *pruinosus.* I was unable to notice much, if any, difference in the telson of the two species.

DISTRIBUTION.—This species, native of countries north and south of the Mediterranean, is included here because it has become established in Bermuda. Three specimens from there were reported by Dollfus, 1890, and the Yale University collection contains numerous specimens collected at Walshingham, Bermuda, by Professor Verrill in 1898 and 1901.

Porcellionides virgatus (Budde-Lund), 1885

Figure 135

Metoponorthus virgatus BUDDE-LUND, 1879, p. 4 (*nomen nudum*); 1885, p. 182

(orig. descr.).—RICHARDSON, 1900, p. 303; 1901, p. 569; 1905, p. 630 (descr.).—VERHOEFF, 1916, p. 124.

Porcellio (Proporcellio) formosus ARCANGELI, 1932, p. 130, Fig. 4. (not Stuxberg, 1875).

See also *P. mulaiki*, p. 522.

"Body oblong oval, convex, smooth or obscurely and finely granulated and tuberculated.

"Inner face of the right mandible furnished with four plumose processes, of the left mandible with five.

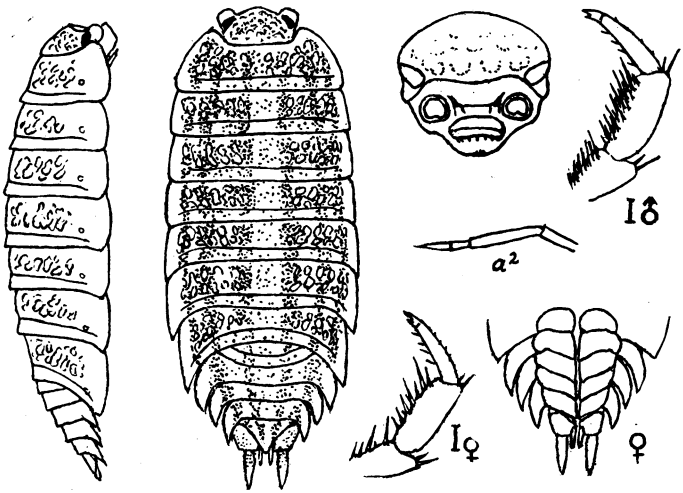

Fig. 135. *Porcellionides virgatus* (Budde-Lund).

"Second pair of antennae equal to half the length of the body; the first article of the flagellum is shorter than the second.

"Antero-lateral lobes of the head small, rounded; median lobe very small, widely rounded; epistome slightly convex, smooth. The terminal abdominal segment is short, triangular, with the sides straight; it is flat above, scarcely excavated.

"Color grayish black; there are white tubercles in the middle of the thorax and white spots arranged in three longitudinal lines.

"The epimera of the thorax are furnished with a shining tubercle distant from the margin. The legs are spotted with black, thickest on the coxae.

"Length, 9–10 mm.; width, 4.5–5 mm.; height, 2–2.2 mm." (Richardson, 1905, p. 630, trans. from Budde-Lund, 1885.)

Eyes with between 25 and 30 ocelli. Upper border of epistome distinct and not very prominent, curving down a little in the middle when seen from in front. There is a transverse row of four large but low and indistinct tubercles on the forehead just above it.

The body surface is fairly smooth and even, but exhibits small smooth granules, not very close together, under moderate magnification. In addition, there are faintly noticable rugae on the lateral regions of the back. Rear angles of first two thoracic segments more or less rounded and forming about a right angle. Those of the third also somewhat rounded and just perceptibly produced back. Those of the others are acute or nearly so, and are more and more produced backward in successive segments. The abdomen is rather small and short, but does not appear abruptly narrower than the thorax, for the abdominal epimera 3, 4, and 5, though acute and curved back in usual manner, are sufficiently long to approximately continue the general elliptical outline of the body. The telson is fairly acute at the apex; its dorsal surface is slightly concave in the middle. The external branches of the uropoda are tapering, acute, and fairly long in the male, but noticeably shorter in the female, and as in many species of this group, there is a sexual difference in the three anterior legs, the males having a brush-like area of slender spines on the carpus and merus, the females a few stout spines only. Tracheae of the pleopoda of the *Porcellio* type are present in the exopodites of the first two pairs only.

The coloration is handsome and conspicuous, the dark gray pigmented areas contrasting strongly with the yellow unpigmented parts, the darker markings being so disposed as to give the back a longitudinally striped appearance as shown in the figure. The external branches of the uropoda are light colored toward the ends, and large light areas on the epimera of the thorax give the body a broad light border. A small light spot surrounds the tubercle alluded to in Budde-Lund's description, which lies in the dark part of the epimera.

Length of the larger Florida specimens over 8 mm.

DISTRIBUTION.—"Ad Aureliam Novam cl. Kröyer nonnulla exampla cepit; etiam e Florida exampla a cl. Leuckart, capta in Mus. Uljanini asservantur." (Budde-Lund, 1885.) "Aurelia Nova" is New Orleans.

The specimens described and figured here and referred to this species are in the American Museum of Natural History and were collected in Florida by Dr. F. E. Lutz in November, 1911, nine at Fort Myers in a grassy field near the river west of the town, and one at Newberry, in second growth pine and palmetto scrub, under rubbish on sandy ground.

Arcangeli, 1932, records and gives some good figures of what is evidently this same species from specimens collected by Prof. Silvestri at Baton Rouge, Louisiana (hence near the type locality), and Uvalde in southern Texas, though he calls it *Porcellio formosus* Stuxberg and refers it to the Old World subgenus *Proporcellio*. Stuxberg's species was described from California and is probably a synonym of *P. laevis*. It does not seem probable that this species occurs in California.

Porcellionides habanensis, new species

Figure 136

Body rather elongate oblong in a dorsal view, the abdomen abruptly narrower. Body surface rather smooth, irregularly rugose to a very slight extent (noticeable

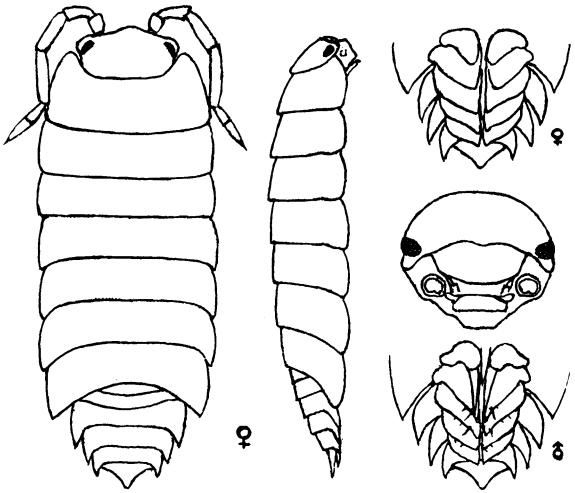

Fig. 136. *Porcellionides habanensis*, new species.

only when the surface is dry) on the dorso-lateral regions of the thorax. The body surface is quite thickly and evenly dotted with minute and extremely short stiff setae, directed backward and so short that they cannot be said to cause a condition of pubescence, but merely to give the surface a scabrous roughness.

The head is well set back into the thorax, and rather wide, its front outline somewhat tumid or prominent in the middle, and with a pair of small, widely separated, obliquely downward and outwardly directed lateral lobes under the eyes. The eyes are widely separated, rather small, oval and bulging, with more than twenty small ocelli. The upper border of the epistome is distinctly marked, but closely appressed in the median region. It is sinuously curved and dips down in the middle. First antennae with the basal joint wide. Second antennae are present in only one of the specimens, an immature male, and are of moderate length and rather stout, reaching

to a point on the third segment when well drawn back. The flagellum is stout; the terminal article exceeds the basal article a little in length, and bears a short, stout spine at the tip.

All the thoracic segments have the lateral ends truncated in a curved outline. In the case of the first three, the rear outline is a little sinuous in the lateral regions and the rear corner is well rounded off. The last four have this corner angular and produced backward to an increasing extent in successive segments. In the female the epimera of segments II to V, inclusive, show evidences of a suture at the base. In abdominal segments three, four, and five the lateral parts are rather wide, moderately produced, curved backward, and acute. The telson is rather wide and short, triangular with slightly concave sides, and rounded off at the extreme tip. Its upper surface is quite smooth and even.

The legs are missing in the two larger specimens. In the immature male, they are fairly long and stout but with rather weakly developed spines. The carpus and merus of the first pair of legs are much wider, stouter, and more flattened than in any succeeding pair. There are a few stout spines on the external margins of the outer lamellae of the pleopoda in the male. Only the basal joints of the uropoda are present in these specimens.

Color yellowish, almost unpigmented, there being only a little very pale brownish pigment on the dorsal regions. In consequence, the small black eyes are very conspicuous.

Length of largest specimen (a female), 6.3 mm.

LOCALITY.—University Hill, Havana, Cuba. One female (type, Cat. No. 6524) and two males collected by Dr. F. E. Lutz, Nov. 18, 1911, with specimens of *Porcellio laevis;* all are in the American Museum of Natural History.

Only very insufficient material of this species is available and better specimens will be required for a satisfactory description. Only one of the males, an immature individual 4 mm. long, is approximately complete. The type lacks the legs, antennae and uropoda, the large male is incomplete, lacking the head and fore part of the body. The circumstances under which it was found suggest that it may be an accidentally introduced Old World form, but I have not found any such species to which I can assign it. I may add that although the pleopoda were not removed for especial study, it appears to be a true *Porcellionides*, not *Tracheoniscus.*

Porcellionides saussurei (Dollfus), 1896

Figure 137

Metoponorthus saussurei DOLLFUS, 1896*d*, p. 48 (orig. descr.), Fig. 2.—RICHARDSON, 1905, p. 626, Fig. 673.

The original description as translated by Richardson, 1905, is as follows:

"Body oval, elongated, feebly and irregularly granulated; each segment of the abdomen has a posterior depression and the first segments are furnished on each side with a little pearl-like granulation.

"Head(?), Thorax.—The first segment has the posterior margin almost straight and not sinuated. Abdomen a little narrower; the lateral processes of the third to the fifth abdominal segments are well developed and a little divergent. Terminal segment triangular, with the sides incurved and obtuse at the apex. Uropoda with the basal segment reaching the apex of the terminal abdominal segment; inner and outer branches very much elongated, the former being linear, the latter

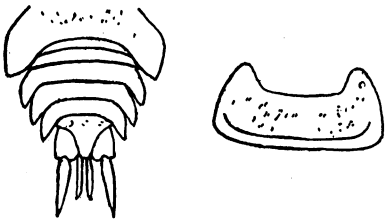

Fig. 137. *Porcellionides saussurei* (Dollfus). Adapted from Dollfus, 1896*d*.

lanceolate. Color, brownish with light wavy spots; there are three little light spots at the base of the terminal segment. Dimensions.—Length, 10 mm.(?). Width, 3 1/2 mm.

"Locality.—Cordova, Mexico."

Porcellionides chilensis (Dana), 1853

Figure 138

Metoponorthus chilensis Budde-Lund, 1879, p. 5; 1885, p. 191.

Porcellio chilensis Dana, 1852–1853, p. 727 (orig. descr.), Pl. xlvii, figs. 9*a*–9*d*.—Miers, 1877*a*, p. 668.

Not *Porcellio chilensis* Nicolet, 1849 (which is probably *P. laevis*).

"Very faintly granulate. Head much transverse, not imbedded in following segment, antero-lateral processes minute, rectangular, front sparingly arcuate. Antennae very minutely hirsute, flagellum slightly shorter than preceding joint, its first joint nearly twice as long as the second. Five anterior articulations of thorax nearly straight transverse. Abdomen short, not longer than broad, third, fourth, and fifth segments laterally salient and acute, last triangular, subacute, sides excavate, breadth at base a little greater than its length. Caudal stylets as long as abdomen, the base hardly reaching to apex of abdomen, shorter branch exsert, a little stout, subulate, having three setae at apex, outer branch stout, acuminate, more than three times as long as the other.

"Length, six to eight lines. There is a resemblance in this species to the *fuegiensis;* yet it is much larger and lighter-coloured. The shorter branch of the stylets is not slender linear, as in the *fuegiensis*, and has three setae at apex; the front is much less projecting. The

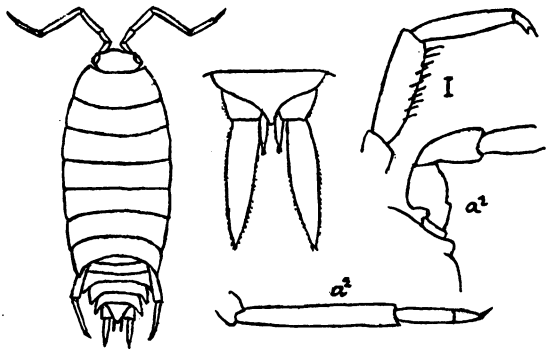

Fig. 138. *Porcellionides chilensis* (Dana). Adapted from Dana, 1855.

granules of the surface are quite small, and there is some pubescence." (Dana, 1852–1853, p. 727.)

LOCALITY.—Valparaiso, Chile.

Possibly a synonym of *P. pruinosus*.

Porcellionides advena (Stuxberg), 1872

Figures 139, 140

Porcellio advena STUXBERG, 1872, p. 4 (orig. descr.), Pl. x; 1875, p. 43.—BUDDE-LUND, 1879, p. 5; 1885, p. 191 (says perhaps a *Metoponorthus*).

In view of the careful illustrations given by Stuxberg, it does not seem necessary to quote in full his lengthy description. The concluding paragraphs of it, which deal with features not shown in the figures, are as follows:

"Sculptura: Series tuberculorum septimi trunci segmenti arcuata, sexti subarcuata, quinti, quarti, tertii, secundi recta, margini anteriori appropinquans. Primum trunci segmentum ad marginem posteriorem serie tuberculorum confluentium majorum, ante quam 2–3 aliae sparsorum minusque conspicuorum. Margo omnium trunci segmentorum aeque ac capitis posterior saepissime laevis, interdum tuberculis fere inconspicuis, longo intervallo distantibus. Omnia caudae segmenta, ultimo excepto, margine postico tuberculis minimis, in medio creberri-

mis, praedito. Cutis, ut plerumque in Oniscoidis, aculeis perbrevibus, trigonis, subseriatim dispositis.

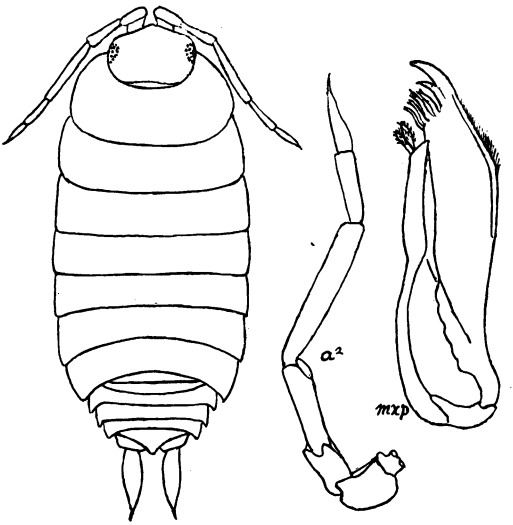

Fig. 139. *Porcellionides advena* (Stuxberg). Adapted from Stuxberg, 1875.

"Color dorsi rufo-griseus, maculis nullis, epimeris haud multo pallidioribus.

"Longitudo 5.5 mm.; latitudo 2.5 mm. Longitudo antennarum exteriorum 3.5 mm." (Stuxberg, 1872, pp. 4, 5.)

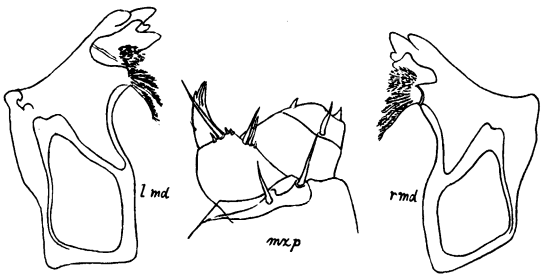

Fig. 140. *Porcellionides advena* (Stuxberg). Adapted from Stuxberg, 1875.

LOCALITY.—Brazil (apparently, from Stuxberg's statement, with some possibility of doubt): "Ex Brasilis (Caldas) duo tantum specimina, in collectione plantarum a Dmno. S. Henschen reportata fortuito inventa, vidimus."

Porcellionides fuegiensis (Dana), 1853

Figure 141

Metoponorthus fuegiensis BUDDE-LUND, 1879, p. 5; 1885, p. 191.

Porcellio fuegiensis DANA, 1853, pp. 726 (orig. descr.), 728, Pl. XLVII, figs. 8*a*–8*d*.—STUXBERG, 1875, p. 43.

"Abdomen abruptly a little narrower than thorax. Head anteriorly with an abrupt vertical surface and acute edge above, antero-lateral process very small and subrectangular, front salient, nearly straight transverse. Segments of thorax in part rugato-granulate; segments of abdomen very finely granulate, third, fourth, and fifth laterally expanded and salient, last triangular, somewhat transverse, and above concave, hardly projecting beyond base of stylets; inner branch of stylets long salient, and short hirsute; outer branch half as long as abdomen.

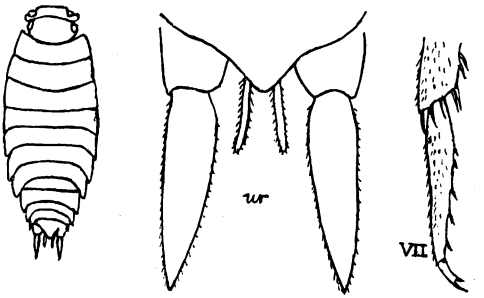

Fig. 141. *Porcellionides fuegiensis* (Dana). Adapted from Dana, 1855.

"Length of body, four lines. The projection of the inner branches of the stylets is a striking character, since they are in sight from above nearly their whole length, and extend one-third of the distance to the apex of the longer stylets. The antennae of the specimens were mutilated, and we are, therefore, in some doubt as to the number of joints of the flagellum. The granules of the surface are hardly granules, they appearing partly like wrinkles though raised, ranging longitudinally across the segments of the thorax near their middle." (Dana, 1853, p. 726.)

LOCALITY.—Near Nassau Bay, Tierra del Fuego.

Included in *Porcellio* with doubt by Dana, owing to the mutilation of the antennae.

Porcellionides brunneus (Brandt), 1853

Metoponorthus brunneus BUDDE-LUND, 1879, p. 4; 1885, p. 171 (new descr.).
Porcellio brunneus BRANDT, 1833, p. 180 (orig. descr.).—MILNE-EDWARDS, III, 1840, p. 172 (descr.).—STUXBERG, 1875, p. 43.
Porcellionides brunneus VAN NAME, 1925, p. 465.

"Oblonge ovalis, paulisper convexus, tenuiter praesertim antice granulatus, minutissime squamatus.

"Antennae exteriores corpore dimidio longiores; 3–4 carinati, articuli 2–3 ad apicem acute dentati. Lobi frontales laterales parvi; linea marginalis frontalis medio curvata. Epistoma linea transversa medio acutius sinuata.

"Cauda a trunci annulo septimo maximam partem complecta; annulus analis brevis, triangulus, lateribus profundius incurvis, supra planus, basi levissime trifoveolato.

"Color e rufo brunneus, uniformis.

"Long. 10 mm. Lat. 4.75 mm." (Budde-Lund, 1885, pp. 171–182.)

LOCALITY.—"Demerary" (Brandt). Type in Berlin Museum (Budde-Lund).

Porcellionides minutissimus (Boone), 1918

Figure 142

Philoscia minutissima BOONE, 1918, p. 601 (orig. descr.), Pl. XCII, fig. 2; 1934, pp. 573, 574.

Through the kindness of Dr. Waldo L. Schmitt of the U. S. National Museum, I have had the opportunity of examining two cotypes of this species, both of them females. The body is rather flattened, ovate in a dorsal view, and much more broadly rounded in front than behind. Its surface is very slightly rugose or roughened with a minute irregular, slightly scabrous tuberculation noticeable only on considerable magnification. At its front end the abdomen is but little narrower than the thorax, not greatly breaking the oval outline of the body, and is rather short and rapidly tapered. The head is fairly wide, its front outline (seen from above) gently convex, with small downwardly and forwardly extending, sharply rounded, almost angular, lateral lobes below the eyes. These lobes project forward sufficiently to be noticeable in a dorsal view. The frontal line is sinuously arched, prominent laterally and very distinct even in the middle; below it the face is abruptly vertically flattened. The supra-antennal line is less well defined but discernible. It dips down in a V-shaped angle in the middle. The antennae would

reach well along the third segment if fully drawn back. They have a long, stout flagellum of two subequal articles. The eyes are rather small with not over ten well-developed ocelli, and are somewhat irregularly pigmented.

The thoracic segments I to III have the rear lateral angle well rounded; in segment IV it forms a slightly rounded off right angle, and in the succeeding ones it is increasingly acute.

The abdominal epimera 3 to 5 are short, moderately wide, and backwardly curved. The telson is triangular with quite strongly concave side outlines. The basal joints of the uropoda reach about to the tip of the telson, the external branches are rather short, stout, and sharply tapered; the slender inner branches are also tapered and flattened from side to side and less than two-thirds as long as the outer.

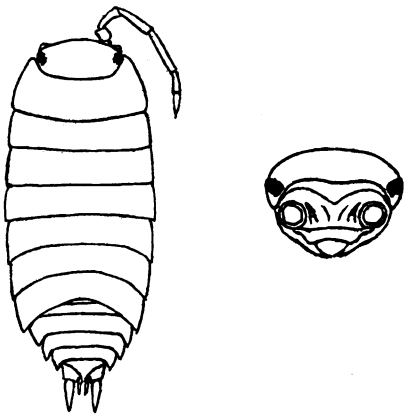

Fig. 142. *Porcellionides minutissimus* (Boone). From cotype in the U. S. National Museum.

The color is light brownish, with little evident pigmentation, as would be expected in a cave species. Miss Boone mentions irregular fuscous patches and a median yellow stripe in the type. The length of one of the cotypes would equal that given for the type by Miss Boone (4 mm.).

Locality.—The type and six other specimens, all in the U. S. National Museum, were secured on bat guano in Hunt's Cave, New Providence, Bahamas.

Porcellionides bermudezi Boone, 1934

Figure 143

Porcellionides bermudezi BOONE, 1934, p. 512 (orig. descr.), Fig. 3.

The figures of this species accompanying the original description do not satisfactorily bring out its close resemblance to *Porcellionides pruinosus* (Brandt).

Dr. C. H. Blake, after examining the type and only specimen, a female only 2.5 mm. long, found at Rincon de Genuelo, Cuba, and now

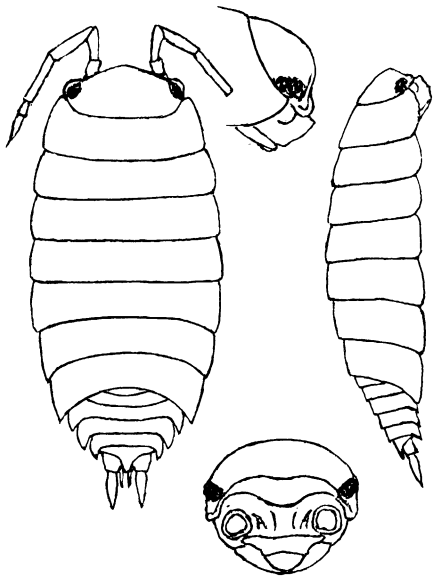

Fig. 143. *Porcellionides bermudezi* Boone.

in the American Museum of Natural History (Cat. No. 6602), expressed the view that it is a young *pruinosus*, and I am very strongly inclined to agree with this opinion. I consider the chief obstacle to definitely placing it among the synonyms of *pruinosus*, to be the lack, at the time of writing, of specimens of *pruinosus* in a correspondingly early stage of growth to permit of an exact comparison.

LEPTOTRICHUS BUDDE-LUND, 1885

"Body rather convex, scarcely contractile, generally setigerous.

"Second pair of antennae short, the first four articles of the peduncle

subequal in length; flagellum composed of two articles, of which the first is much shorter than the second.

"Front of head without a margin, produced in the middle with the epistome bulbous; antero-lateral processes obtuse. Vertical marginal line posteriorly wanting. Eyes small.

"Lateral parts of thoracic segments not expanded.

"Terminal segment of abdomen generally triangular; epimera of the third, fourth, and fifth segments moderately large.

"First and second pairs of pleopoda furnished with tracheae" (Richardson, 1905, p. 624.)

Leptotrichus granulatus Richardson, 1902

Figure 144

Leptotrichus granulatus RICHARDSON, 1902, p. 303 (orig. descr.), Pl. XL, fig. 58.—VERRILL, 1902, p. 844, Fig. 231.—RICHARDSON, 1905, p. 624, Fig. 672.—PEARSE, 1915, p. 543.—BOONE, 1918, p. 603.—ARCANGELI, 1930*a*, p. 3.

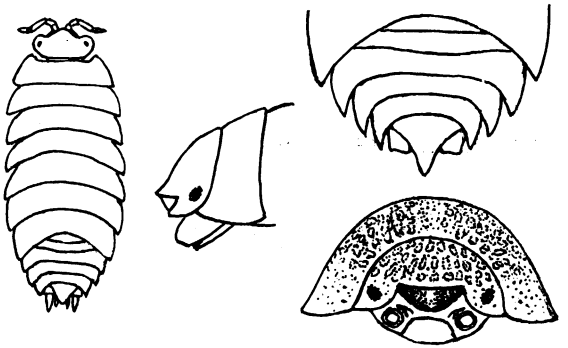

Fig. 144. *Leptotrichus granulatus* Richardson. Left-hand figure adapted from Richardson, 1902. Others from specimen in Yale University Museum.

"Body roughly and minutely granulated. Color light reddish or yellowish brown, with markings of dark brown in patches on each segment, forming four longitudinal rows, the two median rows not extending anteriorly beyond the third segment of the thorax in one specimen, and in the other being almost obsolete.

"The head is produced in front in a prominent, rounded, median lobe, and at the sides in large rounded lateral lobes. The eyes are small, but distinct, and are placed at the base of the lateral lobes. The external antennae are very short, not reaching the anterior angle of the first thoracic segment. The fourth joint of the peduncle is not longer than

the third; the flagellum is composed of two joints, the first of which is about half the length of the second.

"The thoracic segments are subequal in length, the lateral parts broadly expanded.

"The first two abdominal segments have the lateral parts undeveloped. The third, fourth, and fifth segments are broadly expanded laterally, the outer margins forming a continuous and unbroken line with the margins of the thoracic segments, the terminal segment of the abdomen extends but a distance of half its length beyond the epimera of the preceding segment; its surface is smooth, the basal joint of the uropoda attains half the length of the last segment. The outer branch extends half its length beyond this." (Richardson, 1902, p. 303.)

Length of type, 4.15 mm.

I have had the opportunity of examining one of Richardson's Bermuda examples of this species at the Yale University Museum, but the specimen was found to be so brittle, and its legs set in such positions, as not to permit of a satisfactory study without demolishing it. However, its general character suggests probable relationship to the true *Leptotrichus* of the Old World or some allied genus of the *Porcellio* group, rather than to *Trichorhina*, to which most of the supposed American species of *Leptotrichus* really belong.

The following notes were made from this specimen, to supplement Richardson's statements:

Body fairly broad, rather highly arched and more compactly articulated than would be inferred from Richardson's figure.

Dorsal surface with thickly scattered small, low, irregular tubercles, best developed on the head and anterior part of the body; the surface also bears very short, scabrous setae conspicuous when the body is dry.

The large, lateral lobes of the head are greatly extended downward as well as forward; between them, the line of demarcation between the forehead and epistome is prominently convex in a dorsal view, but nearly horizontal and little curved in a front view; the upper part of the epistome is very convex and deeply pigmented. The eyes are oval and contain at least fifteen ocelli.

All the thoracic segments, even the first to a slight degree, have the rear lateral angle extended back to an increasing extent toward the rear of the body; the thoracic epimera are large and descend obliquely.

LOCALITIES.—Type locality, Castle Harbor, Bermuda, "in dead coral." Two specimens, including type, in Yale University Museum

(Richardson, 1902). Pearse, 1915, p. 543, reports it from Santa Marta, Colombia, as follows:

"Thirty specimens of this interesting isopod were collected . . . under some bricks in the patio of our house in Santa Marta; in a log in an ant's nest and under leaves in the forest at Fundacion; under the bark of a rough tree near La Rosa. It has previously been reported only from the Bermudas, where it was found in dead coral."

He does not, however, give any statements or figures in support of his course in assigning his specimens to Richardson's species, and a comparison of material from the two localities would be very desirable.

Leptotrichus vedadoensis Boone, 1918

Figure 145

Leptotrichus vedadoensis BOONE, 1918, p. 603 (orig. descr.), Pl. XCII, fig. 3.

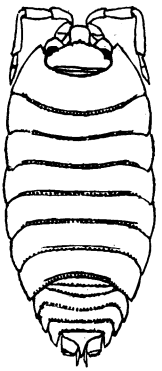

Fig. 145. *Porcellio vedadoensis* Boone. Adapted from Boone, 1918.

"Body elongate-ovate, subconvex, twice as long as wide, 6 mm., 3 mm., densely granulated. Head produced in front in a conspicuous median lobe which is squarish with the anterior margin rounded and is tilted upward and outward; the lateral lobes are large and divergent and broadly rounded. The eyes are moderately large, oval, complex, and situated at the base of the lateral lobes. The second antennae have the first four articles of the peduncle subequal; the fifth is much longer, about 1 mm.; the flagellum is biarticulate, the first article being about two-thirds as long as the second and terminating in a minute hooklike point; the flagellum is about as long as the fifth joint; the second antennae extend to the anterior margin of the second thoracic segment.

"Thorax.—The first segment is slightly longer than the others, about 1 mm., with its lateral margins expanded and surrounding the

head, the second to seventh segments, inclusive, are similar, subequal, with their lateral parts moderately expanded and the post-lateral angles gradually acutely produced. The legs are similar, subequal and have the inner margin ornamented with brushlike tufts of spines.

"Abdomen.—The first and second segments are compressed and have the lateral parts concealed by the seventh thoracic segment; the third, fourth, and fifth segments are broadly expanded, forming a continuous curve with the margin of the thoracic segments; the sixth segment is abruptly narrow, triangulate, with the posterior margins recurved. The peduncle of the uropod is broad, about two-thirds as long as the terminal segment; the inner branch is minute, placed at the inner distal angle of the peduncle; the outer branch is broken off.

"The posterior margins of the head, thorax, and first five abdominal segments are heavily carinated. The entire dorsal surface is densely granulated, has scattered minute pigment spots, and is finely setiferous." (Boone, 1918, p. 603.)

LOCALITY.—La Puntilla, Vedado, near Havana, Cuba. Type and two other specimens in the U. S. National Museum (Boone).

This species does not appear to belong in *Leptotrichus*, but I have left it here provisionally through uncertainty where to place it.

NAGARA BUDDE-LUND, 1908

Established by Budde-Lund, 1908*a*, p. 284, as a subgenus of *Porcellio*, with *Porcellio* (or *Lyprobius*) *cristatus* Dollfus, 1889, as type, though he treats it practically as a genus. He gives the following diagnosis:

"Superficies granulata et squamata. Oculi mediocres; ocelli numero ca. 20. Antennae breviores; flagellum biarticulatum, articulus prior altero multo brevior. Frons in lateribus lobata, in medio carina vel crista transversa, saepe abbreviata instructa. Mandibularum lacinia interior penicillis duobus in mandibula dextra, penicillis tribus in mandibula sinistra. Margo exterior mandibularum serie spinarum munitus. Maxillarum prioris paris lamina exterior dentibus 10 (4 + 6; dentes 1. 3. 4. 6. ad apicem fissi, 2. 5. integri, acuti); lamina interior spina posteriore brevi penicillis ambobus longis, aequalibus. Maxillipedum mala spina longiore et aculeis 3, posterioribus quam anteriore multo majoribus; margo superior articuli 2 di (labialis) hirsutus.

"Trunci segmentum 1. linea collari cum linea laterali manifestiore conjuncta; margo posterior curvatus. Segmentum 2. pronoto mediocri, processu laterali nullo. In epimeris segmentorum 2. 3. 4. in femina linea suturalis adest. Unguiculi pedum appendice simplici.

"Caudae pleopodum exopodita omnium parium tracheis instructa, hae priorum parium saepe parvae. Telsum breve, triangulum. Uropodium scapus latere exteriore breviter triangulo exciso. Exopoditum et endopoditum mediocria."

Nagara cristata (Dollfus), 1889

Figure 146

Leptotrichus emarginatus PEARSE, 1917, p. 5 (descr.), Fig. 3.—VAN NAME, 1925, p. 466.

Lyprobius cristatus BUDDE-LUND, 1893, p. 127 (notes on characters).—DOLLFUS, 1893*a*, p. 345.—VAN NAME, 1925, p. 466.

Nagara cristata BUDDE-LUND, 1908*a*, pp. 281 (*cristatus*), 284 (made type of new subgenus of *Porcellio*, *Nagara;* redescribed), Pl. XIV, figs. 27–39; 1912, p. 381.—VERHOEFF, 1926, pp. 317, 318.—ARCANGELI, 1930*a*, pp. 3, 11, Fig. 3.

Porcellio cristatus DOLLFUS, 1889, p. 91 (orig. descr.), Pl. V, figs. 2*a*–2*d*.

Porcellio (*Nagara*) *cristatus* WAHRBERG, 1922, p. 178, Fig. 57.—ARCANGELI, 1927, pp. 245, 250.

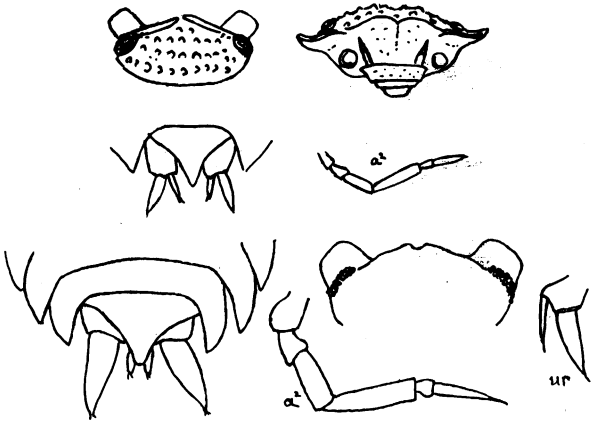

Fig. 146. *Nagara cristata* (Dollfus). Upper figures adapted from Dollfus, 1889. Lower figures from Pearse, 1917 (*Leptotrichus emarginatus*).

The following description is quoted from Budde-Lund, 1908*a:*

"Superficies granulata, maxime ante fortius, et minute squamata.

"Antennae tertiam corporis partem longitudine aequantes; flagelli articulus prior altero fere triplo brevior. Caput lobis lateralibus magnis, rotundate tetragonis; frons media carina vel crista transversa, paulum obliqua, in medio abrupta; epistoma convexiusculum.

"Trunci segmenta 1.–2 margine postico curvato; segmentum 3, margine postico subrecto.

"Caudae segmenta 1.–2 brevia; segmenta 3. 4. 5. epimeris majoribus, distantibus, triangulis, acutis. Telsum epimera segmenti 5. paulum superans, triangulum, lateribus profundius incurvis, apice acutiore.

"Color flavus, in capite obscure brunneus; in trunci medio et lateri bus series macularum fuscarum per longitudine ductae; cauda fusca; telsum pallidum; antennarum articuli duo priores et uropodes pallidi.

"Long. 5.5–6 (7 sec. Dollf.) mm. Lat. 2.3–2.7 mm."

I quote also from Pearse's description, as I have been able to observe the color markings that he describes in the case of specimens from Dominica, West Indies, also. The four longitudinal brown stripes he mentions comprise one on each side along the basal region of the epimera and a very wide median stripe which is nearly divided into two by a series of large median spots on each segment of the thorax. It may be added to his notes that the basal part of the antennae (first two or three segments) is light-colored, and that in the Dominica specimens at least, the light ground color (unpigmented part of the color pattern) is decidedly yellowish.

"Color.—Head brown with small white markings; thorax white, with four irregular longitudinal brown stripes; abdomen with second and third segments white with brown band at middle of posterior margin; third, fourth and fifth segments brown with small white spot at anteromedian margin, last segment white with darker tip; ventral surface and paired appendages white, except the antennae and the tips of the outer rami of the uropoda, which are brown." (Pearse, 1917, pp. 5, 6.)

DISTRIBUTION.—Type locality Surinam (Dollfus, 1889, only locality mentioned). Type probably in Leyden Museum. Budde-Lund, 1893, records it from Caracas, Venezuela, and in 1909 from Colon, Canal Zone, and Puerto Limon, Costa Rica, as well as from Camerun and East Indian localities, stating that it is widely distributed in tropical countries, though not common, and that he had seen only females. Likewise he mentions (1909, p. 285) that it has been found at Hamburg, brought in on palms from Brazil. Additional localities given by Budde-Lund, 1912, are Madagascar and Mahé, Seychelles, at 1600 feet altitude. Arcangeli (1930) reports it from San José and Puente de las Mulas, Costa Rica.

Having examined Pearse's specimens of his "*Leptotrichus emarginatus*" from Dunoon, British Guiana, I agree with Arcangeli's (1930) opinion that it is a synonym. "Taken under the bark of dead wood. Other specimens were collected from the axils of leaves from three to

ten feet above the ground . . . also in dry sand on Hubudibu Creek." (Pearse.)

The American Museum of Natural History has ten specimens from Laudat, Dominica, West Indies, all of them females.

Verhoeff, 1926, p. 317, expresses doubts whether all these records really refer to the same species, but in the present state of our knowledge it seems more probable that this is a species of Old World origin that has acquired a wide distribution through human agency as in the case of a number of other isopods. Lack of exact correspondence in the figures of different authors is probably explainable by the parts being drawn from a slightly different point of view, or to difficulties of observation due to the small size of the animal.

CYLISTICUS SCHNITZLER, 1853

Related to *Porcellio* and especially to *Tracheoniscus*, and, like the latter genus, having the opercular plates of all the pairs of pleopoda with tracheae which are provided with separate openings along a part of the margin of the plate, but it is readily distinguished by its much more convex body and its power of rolling up into a ball. Throughout the greater part of the United States, this and *Armadillidium vulgare* are the only common species, if not absolutely the only species, having this faculty well developed.

Cylisticus convexus (De Geer), 1778

Figures 147A, 148

Cyclisticus convexus PAULMIER, 1905, p. 181, Fig. 54.—PEARSE, 1914, p. 4.

Cylisticus convexus BUDDE-LUND, 1885, p. 77.—SARS, 1899, p. 186 (descr.), Pl. LXXXI.—RICHARDSON, 1900*a*, p. 303; 1901, p. 565.—STOLLER, 1902, p. 213.—RICHARDSON, 1905, p. 609 (descr.), Fig. 665.—NORTON, 1909, p. 251.—FOWLER, 1912, p. 519.—HUNTSMAN, 1913, p. 274.—SHELFORD, 1913, pp. 239, 253.—PRATT, 1916, p. 379, Fig. 607.—KUNKEL, 1918, p. 241 (descr.), Fig. 78.—WALLACE, 1919, p. 40.—LONGNECKER, 1924, p. 198.—ARCANGELI, 1926, p. 38.—JOHANSEN, 1926*b*, p. 166.—WALKER, 1927, p. 179.—BLAKE, 1931, p. 351.—ARCANGELI, 1931, p. 126.—PROCTER, 1933, p. 248.—PRATT, 1935, p. 441, Fig. 609.

Oniscus convexus DE GEER, 1778, 'Mém. des Insectes,' VII, p. 553 (orig. descr.), Pl. XXXV, fig. 11.

Porcellio convexus STUXBERG, 1875, p. 60.—UNDERWOOD, 1886, p. 362.—RATHBUN, 1905, p. 46, check list, p. 4. Probable synonyms:

Porcellio glaber FITCH, 1855, p. 823 (descr.; color var. *confluentus* also described); 1856, p. 119.—BUDDE-LUND, 1885, p. 78.—UNDERWOOD, 1886, p. 362.

Porcellio laevis GOULD, 1841, p. 337.—DE KAY, 1844, p. 52 (not Latreille, 1804).

"Body oblong oval, more than twice as long as it is broad, side-contours nearly parallel, dorsal face strongly vaulted and perfectly

smooth. Cephalon short, transverse, almost 3 times as broad as it is long, lateral lobes rather large, obliquely truncated at the tip, median lobe forming a very small, but distinct acute projection. Side-plates of 1st segment of mesosome very large, partly flanking the cephalon, and acutely produced behind; the succeeding pairs with the posterior corner less acute. Metasome not attaining half the length of the mesosome,

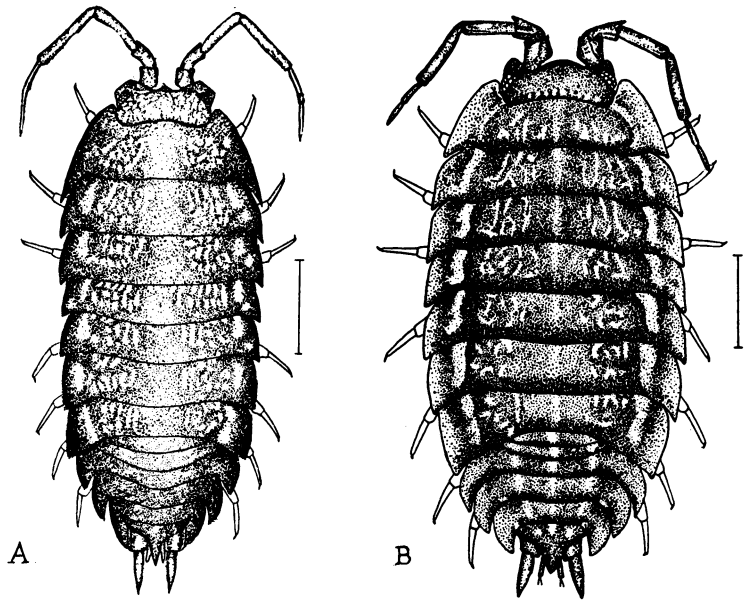

Fig. 147. A, *Cylisticus convexus* (De Geer). B, *Tracheoniscus rathkei* (Brandt). After Paulmier, 1905.

epimeral plates of the first 2 segments concealed, those of the 3 succeeding segments large, recurved, their lateral margins being continuous with the sides of the mesosome; last segment about as long as it is broad at the base, its terminal part conically pointed, and extending as far as the basal part of the uropoda. Eyes rather large and convex. Antennulae with the last joint about as long as the basal one, and conically pointed. Antennae very slender, considerably exceeding half the length of the body, flagellum a little shorter than the last peduncular joint, and having its 2 articulations subequal in length. Legs moderately slender, and of same structure in the 2 sexes. Inner rami of 1st pair of pleopoda in male with the terminal parts divergent. Uropoda rather large, with the

basal part oblong quadrangular, and distinctly keeled along the lower side, outer ramus narrow laceolate, in male considerably exceeding the basal part in length; inner ramus very narrow, linear, and issuing far in front, thus but slightly projecting beyond the basal part. Colour of dorsal face dark iron gray, with a regular row of light patches along each side of the mesosome, and in each segment a group of less conspicuous flexuous stripes on either side of the median line; uropoda generally ferruginous. Length attaining 12 mm." (Sars, 1899, p. 186.)

DISTRIBUTION.—Widely distributed in Europe and the eastern part of North America, where it may be indigenous, as it occurs in woods and other places more or less remote from human habitations, as well as about the latter. It is rather northern in its distribution. Las Vegas Springs, New Mexico, is by far the most southern as well as the most western of numerous localities given by Richardson, 1905.

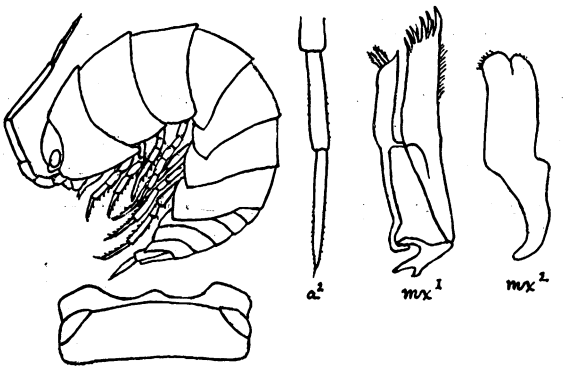

Fig. 148. *Cylisticus convexus* (De Geer). Adapted from Sars, 1899.

Longnecker, 1924, reports it from several places in Iowa and Pearse, 1914, from Moleen Canyon, Nevada. Walker, 1927, says it is the commonest of the larger land isopods in southeastern Canada next to *Tracheoniscus rathkei*, and records it from localities in New Brunswick and in southern Ontario and Quebec, and Arcangeli, 1932, from Frontenac and St. Paul, Minnesota. The American Museum has a specimen labeled "St. Johns, Labrador." Probably Newfoundland was meant.

SUBGENUS OR GENUS **TRACHELIPUS** BUDDE-LUND, 1909

(See genus *Tracheoniscus* Verhoeff)

TRACHEONISCUS VERHOEFF, 1917

This genus was split off from Porcellio by Verhoeff, 1917*a*, p. 199,

with *Porcellio rathkei* Brandt as the type, on the ground of its having the external plates of all the five pairs of pleopoda instead of only two or three provided with tracheae. Moreover, these tracheae are little branched and open by a row of small pores along a part of the external margin of the plate instead of by a single large orifice near the articulation of the plate, as in *Porcellio* proper.

Budde-Lund, 1908*a*, p. 281, had already proposed a subgenus of *Porcellio* with *P. rathkei* as type, to which he gave the name *Trachelipus*, but as he gave no diagnosis or reasons for this separation of the group, I am using Verhoeff's name. The group contains other species in the Old World, and in spite of the practically complete superficial resemblance to the true Porcellios, it seems to be deserving of recognition as a genus. Perhaps other American species assigned to *Porcellio* or *Porcellionides* in this work may prove to belong here when their respiratory apparatus is studied.

Tracheoniscus rathkei (Brandt), 1833

Figures 147B, 149

Porcellio rathkei BRANDT, 1833 (orig. descr.).—BUDDE-LUND, 1879, p. 2; 1885, p. 85 (descr.).—RICHARDSON, 1900*a*, p. 304; 1901, p. 567.—STOLLER, 1902, p. 212.—RICHARDSON, 1905, p. 617 (descr.), Fig. 668.—RATHBUN, 1905, p. 45, check list, p. 4.—PAULMIER, 1905, p. 182, Fig. 55.—NORTON, 1909, p. 251.—SHELFORD, 1913, pp. 220, etc.—PEARSE, 1911, p. 108.—FOWLER, 1912, p. 518.—HUNTSMAN, 1913, p. 274.—PRATT, 1916, p. 379.—VERHOEFF, 1917*a*, p. 221.—KUNKEL, 1918, p. 246, (descr.), Fig. 81.—WALLACE, 1919, p. 41.—LONGNECKER, 1923, p. 198.—ARCANGELI, 1926, p. 22.—JOHANSEN, 1926*b*, p. 166.—WALKER, 1927, p. 177.—JOHANSEN, 1929, p. 106.

Porcellio trilineatus STUXBERG, 1875, p. 59.—UNDERWOOD, 1886, p. 363.

Porcellio vittatus FITCH, 1855, p. 824; 1856, p. 120.—UNDERWOOD, 1886, p. 363.

Trachelipus rathkei BLAKE, 1931, p. 353.—PROCTER, 1933, p. 248.

Tracheoniscus rathkii ARCANGELI, 1932, p. 132.

"Body oval, somewhat broader in female than in male, dorsal face rather convex and slightly tuberculated. Cephalon with the lateral lobes well developed, rounded, frontal lobe short, obtusely triangular. Side-plates of mesosome of moderate size, subcontinuous, with the posterior corners obtusely acuminate. Metasome scarcely attaining 1/4 of the length of the body, epimeral plates of 3rd to 5th segments well developed, recurved; last segment subtriangular, outer part acutely produced and plane above. Antennae rather slender, nearly attaining half the length of the body, flagellum about the length of the last peduncular joint, and having its proximal joint somewhat shorter than the distal one. Last pair of legs in male stronger than in female, with the

carpal joint remarkably dilated near the base. Opercular plates of all the pleopoda with air cavities. Uropoda with the outer ramus broadly lanceolate, inner extending considerably beyond the last caudal segment. Colour of dorsal face somewhat variable, being in female, as a rule, lighter than in male, with irregular dark patches intermingled with some of a ferruginous hue, and more generally exhibiting a row of more or less distinct whitish patches on each side of the mesosome, at the base of the side-plates. Colour of male specimens generally dark slaty grey, with 3 longitudinal rows of whitish patches on the mesosome, the one median,

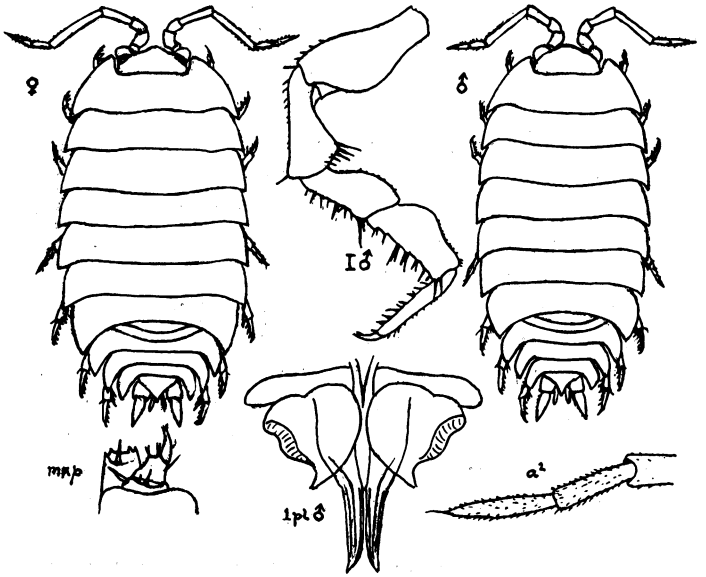

Fig. 149. *Tracheoniscus rathkei* (Brandt). Adapted from Sars, 1899.

the 2 other sublateral, and between these rows on each segment an assemblage of light, wavy stripes. Length of adult female 12 mm." (Sars, 1899, p. 180.)

The dilation of the carpus of the seventh legs above referred to is a quite prominent keel-like or fin-like expansion of very obtusely triangular outline, borne on the dorsal border of the carpus for a considerable part of its length. Its margins are smooth without teeth or spines.

Localities.—This well-known species, found about human habitations in both the Old and New Worlds (though doubtless originating in

the former), is widely distributed in the Eastern United States. The only American record of it from south of the United States appears to be one from Cuatotolapam, State of Vera Cruz, Mexico (Pearse, 1911). These specimens were identified (with some doubt) by Richardson, who stated that they differ somewhat in markings from those from the United States. The other most southern localities given by Richardson, 1905, are St. Mary's, Georgia, and Victoria, in southern Texas. Longnecker, 1924, reports it from various places in Iowa, but the records indicate that it is mainly confined to the eastern part of the continent. Though it is the commonest land isopod in southeastern Canada (in settled districts at least), it does not extend far north (see Walker, 1927; Johansen, 1929, p. 106).

RHYSCOTUS BUDDE-LUND, 1885

Figure 150

This group is distinguished by the bulbous expansion of the epistome (more strictly speaking, that part of it formed by the frontal lamina) which is well marked off from the rest of the head, and by the very wide short maxillipeds, which have the palp and molar portions also very wide and proportionately short.

Its species are almost unique among land isopods in being hermaphroditic, the individuals being males when young and later developing functional ovaries and marsupial plates, though retaining the male type of pleopoda. This peculiar combination of male and female characters was observed and recorded in *R. laxus* by the present writer (1924, p. 200) though its explanation was not discovered. The matter has been investigated since by Jackson (1928, pp. 527–537) who discovered that it was a true case of hermaphrodism. The only other recorded case among land isopods, according to Jackson's statement, is that of *Philoscia elongata* (see Arcangeli, 1925, Mon. Zool. Ital., XXXVI, pp. 105–122). Budde-Lund (1908*a*, pp. 298–302) makes this the type and only genus of a subfamily Rhyscotinae of the Oniscidae, and classifies its species into two sections, to which, however, he gives no names. He includes in *Rhyscotus*, as a synonym, *Hypergnathus* Richardson, 1905.

Of the species found in the region covered by this article, *R. parallelus*, *R. ortonedae*, *R. cubensis*, *R. ciferrii*, and *R. laxus* belong to Budde-Lund's first section of the genus, characterized by a triangular, practically straight-sided telson, the tips of the legs with short claws and a small vesicular pad,[1] and the inner branch of the uropoda equaling

[1] Arcangeli, 1930*b*, p. 38, expresses doubt regarding the vesicular nature of this structure.

the basal segment in length. The second section, containing *R. sphaerocephalus, R. nasutus, R. turgifrons, R. albidemaculatus, R. jacksoni,* and *R. texensis,* has the telson short-triangular with concave sides, the legs tipped with a long, simple claw, and the inner branch of the uropoda shorter than the basal segment. Within each section, the species are much alike and are so minute and so soft-bodied that the small differences in the shape of the parts existing between species are hard to determine

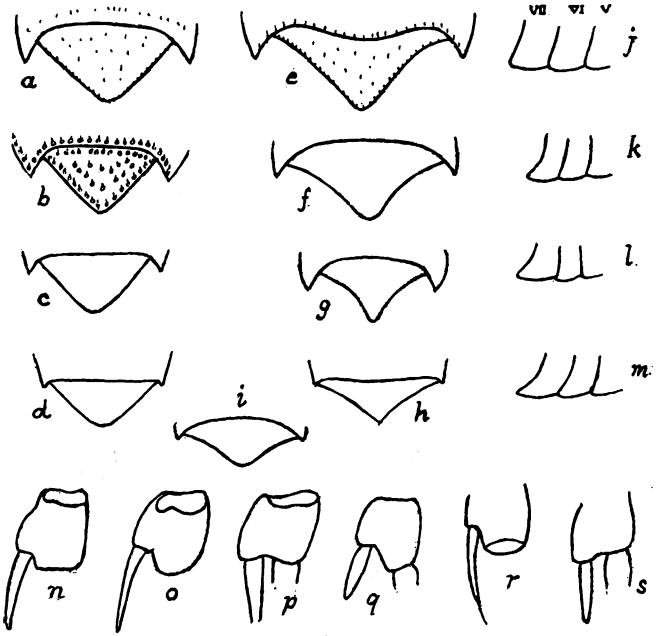

Fig. 150. Comparison of species of *Rhyscotus.* Outlines taken from the figures of various authors.

Outline of telson: *a, R. ortonedae; b, R. parallelus; c, R. laxus; d, R. ciferrii; e, R. sphaerocephalus; f, R. nasutus; g, R. albidemaculatus; h, R. jacksoni; i, R. texensis.* Outlines of last three thoracic segments: *j, R. ortonedae; k, R. sphaerocephalus; l, R. nasutus; m, R. laxus.* Basal segment and inner branch of uropod: *n, R. sphaerocephalus; o, R. nasutus; p, R. ortonedae; q, R. texensis; r, R. jacksoni; s, R. laxus.*

and still harder to describe and illustrate. However, there appear to be well-marked differences in the form of the uropoda in some of the species.

Rhyscotus parallelus Budde-Lund, 1893

Figures 150B, 151

Rhyscotus parallelus Budde-Lund, 1893, p. 119 (orig. descr.).—Dollfus,

1893*a*, p. 342, Pl. IX, figs. 6–6*d*.—BUDDE-LUND, 1908*a*, p. 299, Pl. XVII, figs. 9–10.—VAN NAME, 1924, p. 200.—JACKSON, 1928, p. 529.—ARCANGELI, 1930*b*, pp. 31, 38.

The following statements are taken from the original description:

"Elongatus, angustus, convexiusculus, sparse et minutissime setiger. Antennae tertia corporis parte vix longiores; flagellum scapi articulo quinto subaequalis, articulus prior altero duplo brevior. Oculi minores, ocelli pauci, circiter 6–8. Frons ante delete marginata; epistoma valde bulbosum, frontem satis superans, sulco paulum profundo subrecto a fronte discretum.

"Trunci segmenti primi margo posterior curvatus, segmentorum 2–3–4 subrectus, segmenti quinti utrinque leviter sinuatus, segmentorum 6–7 in medio leviter incurvus. Epimera caudae segmentorum

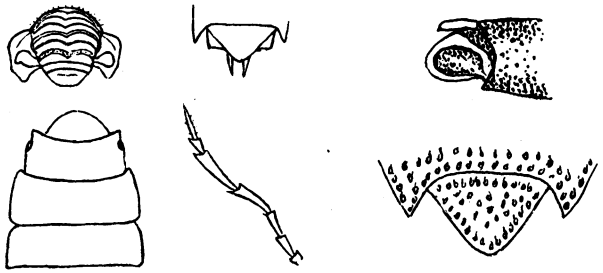

Fig. 151. *Rhyscotus parallelus* Budde-Lund. Adapted from Dollfus, 1893, except two right-hand figures, adapted from Budde-Lund, 1908*a* (upper figure tip of a leg).

3–4–5 brevissima, epimera segmenti quinti tamen praecedentibus paulo majora; segmentum anale breve, late rotundate triangulum, semicirculo brevi haud dissimile, supra convexum, basi media puncta profunde impressa.

"Long. 4–4.5 mm. Lat. 0.9–1.3 mm."

DISTRIBUTION.—Vicinity of Caracas, Venezuela (Budde-Lund, Dollfus; obtained by beating bushes, according to Budde-Lund). Specimens in the Copenhagen Museum (Budde-Lund); these probably include the type.

Rhyscotus ortonedae Budde-Lund, 1908

Figures 150*a*, 150*j*, 150*p*, 152

Rhyscotus ortonedae BUDDE-LUND, 1908*a*, p. 299 (orig. descr.), Pl. XVII, figs. 11–31.—VAN NAME, 1924, p. 200.—JACKSON, 1928, p. 528–537, Figs. 1–6 (anat.); 1928*a*, p. 586, Fig. 15.—ARCANGELI, 1930*b*, pp. 31, 38, 32 (misprinted *orthonedae*).—BARNARD, 1932, p. 289.

The original description is here quoted in full:

"Antennae longae, fere duas corporis partes aequantes; scapi articulus 2. paulo longior quam articulus 3., fere duplo brevior quam articulus 4., articulus 5. multo longior quam articulus 4.; paulo longior quam flagellum; flagelli articuli subaequalis, vel articulus prior altero sublongior.

"Epistoma valde bulbose productum, fere semiglobosum, frontem superans; frons ab epistomate sulco profundo, subrecto, in medio levissime recurvo discreta.

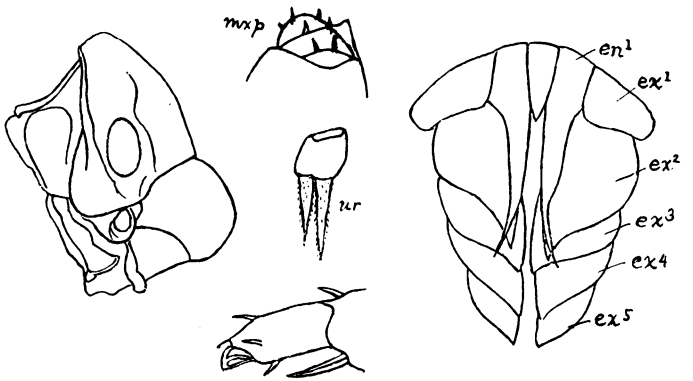

Fig. 152. *Rhyscotus ortonedae* Budde-Lund. Large figures after Jackson, 1928*a* and 1928. Small figures after Budde-Lund, 1908*a* (lower figure tip of a leg).

"Trunci segmenta 1. 2. margine postico leviter curvato, angulis posticis late rotundatis, obtusis; segmentum 3. margine postico subrecto; segmentum 4. margine postico in medio leviter incurvo; segmenta 3. 4. angulis posticis late rotundatis, obtusis; segmenta 5. 6. 7. margine postico in medio fortius incurvo, angulis posticis in segmentis 5. 6. rotundate Subrectis, in segmento 7. acutioribus.

"Color griseus, ad latera pallidior; caput caudaque obscuriora; scapus uropodorum pallidus.

"Long. 5.5 mm. Lat. 2 mm."

DISTRIBUTION.—Near Naranjito, Guayas Province, Ecuador (Budde-Lund), and Samoan Islands (Jackson).

Rhyscotus cubensis Budde-Lund, 1908

Rhyscotus cubensis BUDDE-LUND, 1908*a*, p. 300 (orig. descr.).—VAN NAME, 1924, p. 201.—ARCANGELI, 1930*b*, pp. 31, 38.

Known only from one incomplete specimen which Budde-Lund describes as follows:

"Superficies sparse et minutissime setigera. Oculi parvi, ocelli pauci. Antennae . . . Epistoma satis globose productum, latius quam longius, a fronte sulco transverso, recto discretum. Trunci segmentum 1. margine valde curvato; segmentum 2. margine posteriore leviter curvato; segmenta 3. 4. margine posteriore in medio leviter incurvo, sub transverso; anguli posteriores segmentorum 1.–4. rotundati. Telsum? Uropodes? Color fuscus ad latera dilutior.

"Locality.—Cuba."

Budde-Lund places this species in the first of his above-mentioned sections of the genus on account of the legs being tipped with a short claw and pad. See also remarks under *R. ciferrii*.

Rhyscotus ciferrii ciferrii Arcangeli, 1930

Figures 150*d*, 153

Rhyscotus ciferrii ARCANGELI, 1930*b*, p. 35 (orig. descr.), Fig. 2.

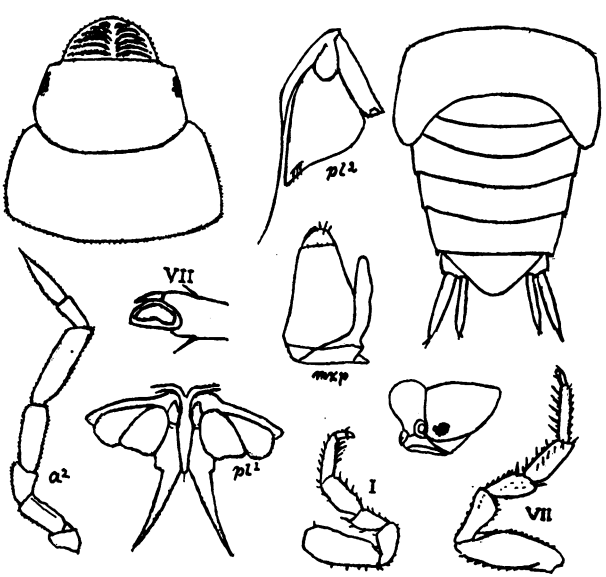

Fig. 153. *Rhyscotus ciferrii* Arcangeli. Adapted from Arcangeli, 1930*b*.

Body very elongate (length three and one-half times the width) with almost parallel sides, slightly rough with scattered small setae similar to those of the genus *Trichorhina*, which are easily rubbed off.

Frontal margin of head nearly straight; the bulbous expansion of the epistome extends forward for a distance of more than half the length of the head proper, from which it is marked off by a distinct sulcus. It exhibits eight yellowish transverse stripes alternating with brown ones, and bears characteristic clavate setae. Eyes rather small, not prominent, located in a slight depression and composed of ten ocelli. Antennae rather stout, pilose, when drawn back they extend little beyond the rear of the second segment. Rear angle of first four thoracic segments rounded (especially in segment I). In the remaining thoracic segments it is also rounded off to some extent, and only in the case of segment VII is it very much extended back. The lateral ends of segments II to VII are nearly straight.

Abdominal segments 3 to 5 have small, sharp, appressed, backwardly directed rear angles which scarcely break the continuous side outlines of the abdomen, though they are larger than in *R. jacksoni*. Telson triangular, more than twice as wide as long, with very slightly convex lateral margins; a somewhat rounded apex and a slight but wide median dorsal depression on the distal part. Uropoda very small.

Color deep chestnut-brown with yellowish spots on the thorax and larger yellowish areas at the junction of the epimera with their segments which may extend on the epimera to their rear angles.

Length about 5 mm.; width less than 1.4 mm.

Locality.—Los Hermanos Islands near Santo Domingo, West Indies. Twenty-six examples collected by Dr. R. Ciferri.

Arcangeli remarks that this species may be identical with the insufficiently described *R. cubensis* Budde-Lund. Although it evidently belongs to the group that, according to Budde-Lund, possesses small vesicular pads under the terminal claws of the legs. Arcangeli (p. 38) expresses disbelief in the view that the small pad-like structure is really a vesicle, at least in the case of this species.

Rhyscotus laxus Van Name, 1924

Figures 150*c*, 150*m*, 150*s*, 154

Rhyscotus laxus Van Name, 1924, p. 198 (orig. descr.), Figs. 20–22.—Jackson, 1928, p. 527.—Arcangeli, 1930*b*, p. 32.

"Body long and narrow, and moreover so loosely articulated that considerable motion of the segments in a longitudinal direction is possible, while the soft integument permits of a varying degree of lateral spread of the free lateral ends of the segments. The illustration here given shows the segments quite closely approximated, so that, seen

from above, the outline is that of a narrow ellipse. Many of the preserved specimens are more relaxed and longitudinally extended, so that they exhibit a more parallel-sided outline.

"Body surface evenly, but not very thickly, covered with short hairs or setae, visible only on considerable magnification. The antennae, uropoda, and legs are also more or less setose. Along the free borders of the segments the setae are a little longer and stouter and form a regular row closer together than on the general surface of the body.

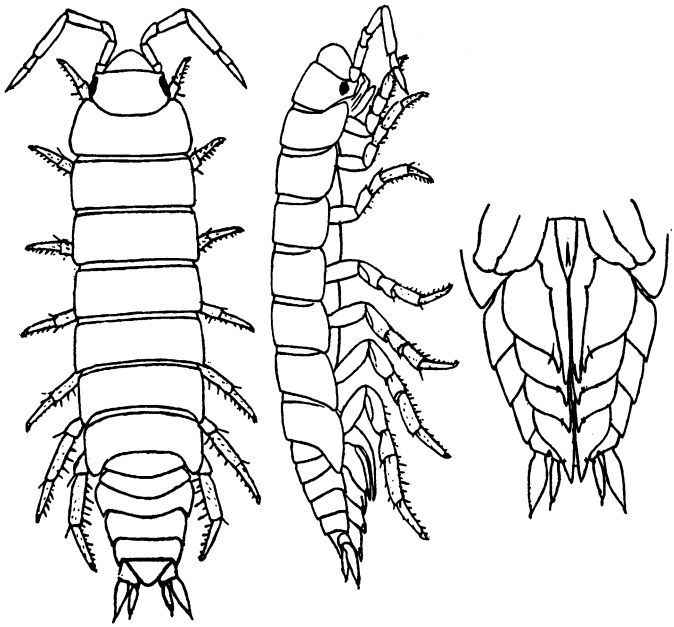

Fig. 154. *Rhyscotus laxus* Van Name. Adapted from Van Name, 1924.

"A nearly straight transverse furrow marks off the epistome from the main or posterior part of the head. The latter is produced downward and a little forward into an obtuse lobe on each side below the eyes, which have few, apparently usually about ten, well-developed ocelli. The epistome forms a large, rounded projecting bulbous expansion of the anterior median part of the head between the sockets of the second antennae. It is covered like the rest of the body and head with scattered, short setae and shows on careful examination a number of very faint transverse furrows on its anterior aspect, but these are so shallow and

poorly marked as to easily escape notice altogether." (Quoted from original description, where additional details are given.)

Both branches of the uropoda are short, the endopod laterally compressed and the exopod stout, furrowed on the external aspect and provided with a short terminal bristle. The basal joint is peculiar in being obliquely truncated so that the endopod is inserted farther back than the exopod.

Length of largest specimens 4.25–5 mm., depending on the state of contraction of the muscles.

DISTRIBUTION.—Tower and South Seymour Islands, Galapagos, found under blocks of lava and among dead leaves. Type (in the American Museum of Natural History) from Tower Island.

In the shape of the telson and in many characters of the head, this species evidently much resembles *R. parallelus* from Venezuela, but if we may judge by the figures of Dollfus here reproduced in outline, the transverse furrows on the epistome are much less conspicuous and the antero-lateral lobes of the head less acute in this species.

Rhyscotus sphaerocephalus Budde-Lund, 1893

Figures 150*e*, 150*k*, 150*n*

Rhyscotus sphaerocephalus BUDDE-LUND, 1893, p. 120 (orig. descr.).—DOLLFUS, 1893*a*, p. 344.—BUDDE-LUND, 1908*a*, p. 301, Pl. XVII, figs. 34–36.—ARCANGELI, 1930*b*, p. 31.

The following statements are taken from the original description:

"Oblongus vel elongatus, post paulum angustatus, convexiusculus, sparse et minutissime setiger. Antennae ut in *Rh. parallelo;* flagelli articulus prior altero duplo vel fere triplo brevior. Oculi majores, ocelli plures. Frons ante vix marginata; epistoma late bulbusum, frontem non superans, sulco vel linea impressa in medio paulum recurva, in lateribus subrecta a fronte discretum.

"Trunci segmentorum margo posterior ut in *Rh. parallelo.* Caudae segmenta duo priora segmentis sequentibus non breviora; epimera segmentorum 3–4–5 brevissima, segmentum anale perbreve, triplo vel magis latius quam longius, triangulum, lateribus late incurvis, apice obtuso. . .

"Long. 4.5–4.7 mm. Lat. 1.4–1.5 mm."

DISTRIBUTION.—Caracas, Venezuela, under bark and in earth.

Rhyscotus nasutus Budde-Lund, 1908

Figures 150*f*, 150*l*, 150*o*

Rhyscotus nasutus BUDDE-LUND, 1908*a*, p. 301 (orig. descr.), Pl. XVII, figs. 37–40.—ARCANGELI, 1930*a*, p. 5; 1930*b*, p. 31.

The original description is here quoted in full:

"Sublaevis, minutissime et sparsissime setigerus.

"Oculi magni; ocelli numero ca. 20.

"Antennae breviores; scapi articulus 2. paulo longior quam articulus 3.; articulus 4. multo longior quam articulus 2.; articulus 5. nonnihil longior quam articulus 4.; flagellum articulo 5. scapi longitudine aequale, articulus prior altero multo brevior.

"Trunci segmenta 1.–5. angulis posticis rotundatis, obtusis; segmentum 5. angulis rotundate subrectis, segmentum 6. angulis rotundate acutioribus, segmentum 7. angulis acutis.

"Telsum plus duplo latius quam longius, lateribus leviter incurvis, apice late rotundato.

"Long. 4.5 mm. Lat. 1.8 mm."

LOCALITY.—Near Realejo, Nicaragua. One specimen, "living among sheathing leaf bases of *Epiphytia tillandsiae*."

Rhyscotus turgifrons Budde-Lund, 1885

Rhyscotus turgifrons BUDDE-LUND, 1885, p. 192 (descr.).—STEBBING, 1893, p. 429.—RICHARDSON, 1901, p. 569; 1905, p. 631 (descr. after Budde-Lund).—BUDDE-LUND, 1908*a*, p. 302.—ARCANGELI, 1930*b*, p. 30.

Stenomacrus turgifrons BUDDE-LUND, 1879, p. 5 (*nomen nundum*).

Known only from the brief description of Budde-Lund here quoted in full:

"Oblongus, post attenuatus, convexiusculus, minute et dense punctatus, sparse crinitus. Mala interior mandibularum penicillis binis? Antennae exteriores corpore dimido longiores, flagelli articulus prior altero fere duplo brevior. Caudae annulus analis brevis, lateribus leviter incurvis, apice obtuso, supra sulcatus. Pedes anales longiusculi; articulus basalis annulo anali sublongior; ramus exterior terminalis conicus; ramus interior tenuis, paululum curvatus, apice setaceo.

"Color e nigro brunneus, in epimeris dilutior; venter e fusco griseus; pedes fusci.

"Long. 5 mm. Lat. 2 mm. Alt. 1.3 mm.

"PATRIA.—Specimen descriptum, mutilatum, a cl. Prof. A. S. Oersted ex insula "St. Jean" Indiae occidentalis allatum, in Museo Hauniense asservatur." (Budde-Lund, 1885, p. 192.)

Rhyscotus albidemaculatus Budde-Lund, 1908

Figure 150*g*

Rhyscotus albidemaculatus BUDDE-LUND, 1908*a*, p. 302 (orig. descr.), Pl. XVII, fig. 46.—ARCANGELI, 1930*b*, p. 31.

Previously mentioned in print as "an obscure isopod, Brazilian" in 17th Ann. Rept. Univ. Mus. Oxford, 1904, p. 43.

The original description is here quoted in full:

"Superficies minutissime setigera-squamata.

"Oculi majores; ocelli numero ca. 16. Flagellum antennarum articulo priore quam altero vix vel paululo breviore. Epistoma valde globosum, sulco minus profundo subrecto a fronte discretum.

"Trunci segmenta 1. 2. 3. margine postico valde curvato, angulis posticis late rotundatis, obtusis; segmenta 4. 5. margine postico subrecto, angulis posticis subrectis; segmenta 6. 7. margine postico in medio late incurvo, angulis posticis acutioribus. Pedes?

"Telsum breve, triangulum, lateribus fortiter incurvis, apice acutiore. Uropodes?

"Color e nigro fuscus, epimeris macula albida oblonge-rotundata, prope angulos posteriores pictus.

"Long. 7.5 mm. Lat. 3 mm."

LOCALITY.—Rio Janeiro. One specimen received by Budde-Lund, from the Oxford Museum, for determination.

Rhyscotus jacksoni Arcangeli, 1930

Figures 150*h*, 150*r*, 155

Rhyscotus jacksoni ARCANGELI, 1930*b*, p. 32 (orig. descr.), Fig. 1.

This species, which is described at some length by Arcangeli, has the body smooth and glossy above and rather wide as compared with other known species of the group.

The head is about twice as wide as long, not taking into account the bulbous epistome, that projects forward of the frontal line (which is slightly sinuous) for a distance little more than half the length of the head proper. Seen from one side, the outline of the bulbous part continues the curve of the upper surface of the head. It is marked with nine yellowish, more or less curved stripes alternating with brown ones. The eyes are large and prominent, with sixteen ocelli; the antennae are two-fifths the length of the body.

The thoracic segments I and II are not extended back and have the rear angles "obtuse." In segments III and IV, the angles are about a right angle and there is slight concavity of the posterior margins of the segment; in the last three segments the angles become acute and increasingly extended back.

The rear angles of the abdominal segments 3 to 5 are small, appressed, and barely visible in a dorsal view, so that the lateral abdominal

outlines are smoothly continuous, the telson is triangular, more than twice as wide as long, its apex angular (about a right angle) and its sides slightly concave. There is a median dorsal sulcus on its distal half.

Coloration of the dorsal surface well marked, the yellowish (unpigmented) and brown pigmented areas forming on the thorax a somewhat noticeable longitudinally banded pattern, described in detail by Arcangeli.

Length about 4.5 mm.; width a little less than 2 mm.

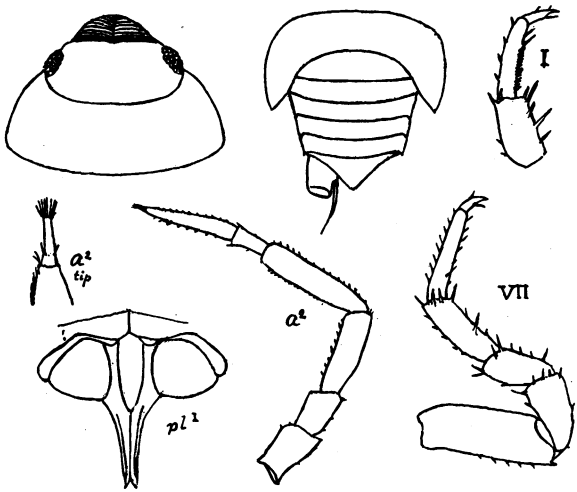

Fig. 155. *Rhyscotus jacksoni* Arcangeli. Adapted from Arcangeli, 1930*b*.

LOCALITY.—Los Hermanos Islands near Santo Domingo, West Indies. One imperfect specimen collected by Dr. R. Ciferri.

Rhyscotus texensis (Richardson), 1905

Figures 150*i*, 150*q*, 156

Hypergnathus texensis RICHARDSON, 1905, p. 632 (orig. descr.), Figs. 675–677.
Rhyscotus texensis BUDDE-LUND, 1908*a*, p. 302.—ARCANGELI, 1930*b*, p. 31.

"Body oblong-ovate, more than twice as long as wide, 2 1/2 mm. 6 mm. Surface perfectly smooth.

"Head a little wider than long, 1 mm.:1 1/2 mm., with the front not margined, straight, continuous between the eyes with the epistome, which is strongly arched, and gives the appearance of a median lobe. There are no lateral lobes. The lateral angles are rounded. The eyes

are small, round, composite, and situated at the sides of the head close to the lateral margins. The first pair of antennae are small and inconspicuous. The second pair have the first three articles short and subequal; the fourth is about one and a half times longer than the third; the fifth is twice as long as the third. The flagellum is composed of two unequal articles, the second one being three times as long as the first.

"The seven segments of the thorax are about equal in length; the first one has the antero-lateral angles slightly produced forward and rounded; the last three have the post-lateral angles posteriorly produced, becoming gradually more acutely produced. The epimera are united with the segments.

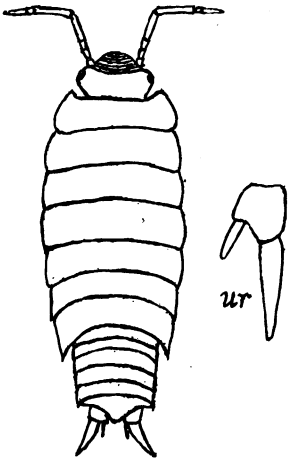

Fig. 156. *Rhyscotus texensis* (Richardson). Adapted from Richardson, 1905.

"The color is a light yellow, with irregular markings of brown on the posterior margins of the segments and on the lateral parts. The head is thickly covered with brown markings, which on the produced portion are arranged in definite transverse lines, but on the remaining surface are arranged irregularly around small, rounded, yellow areas. The abdomen is very closely covered with the brown as is also the posterior half of the outer uropod." (Richardson, 1905, pp. 632, 633.)

LOCALITY.—Texas. The types, collected by H. S. Barber, are in the United States National Museum.

This species was made the type of a new genus, *Hypergnathus*, by Richardson, 1905, p. 631. Budde-Lund, 1908, regards it, quite correctly, I believe, as not distinguishable from *Rhyscotus*.

Armadillidiidae

A family whose members much resemble the Cubaridae in appearance because of their highly arched body and faculty of rolling up into a ball, but are at once distinguishable by the uropoda, which have the external branch broad and lamellar, hinged to the end of the basal joint, and forming part of the external contour of the rear end of the body. Usually the upper part of the epistome forms a prominent vertical triangular shield. But two pairs of pleopoda have tracheae in the external plates. The Armadillidiidae are chiefly confined to the Old World. The few species that have reached America apparently have done so through human agency. (This family name must not be confused with Armadillidae, syn. of Cubaridae.)

ARMADILLIDIUM BRANDT, 1830

"Body oblong or elliptical in form, very convex, and capable of being rolled up into a perfect ball. Cephalon with the front distinctly marginate, lateral lobes rounded, and sharply defined at the base. Epistome vertical, forming above a triangular shield, advancing more or less beyond the frontal edge. Side-plates of 1st segment of mesosome large, securiform, not incised behind. Metasome semicircular, with the edges continuous throughout; last segment lamellar, quadrangular or triangular in form, not extending beyond the limits of the epimeral plates of the penultimate segment. Eyes distinct, lateral. Antennulae with the terminal joint but little produced. Antennae, as a rule, not attaining half the length of the body, penultimate peduncular joint scarcely longer than the 2nd; flagellum biarticulate. Opercular plates of only the first 2 pairs of pleopoda with air-cavities. Uropoda very short, with the basal part broad, lamellar, outer ramus spatulate, inner narrow, cylindric." (Sars, 1899, p. 188.)

The following familiar species is the type.

Armadillidium vulgare (Latreille), 1804

Figures 157, 158, 159

Armadillidium cinereum ARCANGELI, 1932, p. 126.

Armadillidium pilulare STUXBERG, 1875, p. 63.—UNDERWOOD, 1886, p. 360.

Armadillidium vulgare BUDDE-LUND, 1885, p. 66.—DOLLFUS, 1890, p. 66.—DAHL, 1892, p. 110.—DOLLFUS, 1894, p. 3; 1896*c*, p. 530; 1896*e*, p. 357; 1897, p. 206; 1897*a*, p. 2.—MICHAELSEN, 1897, p. 124.—SARS, 1899, p. 189 (descr.), Pl. LXXXII.—KRAEPELIN, 1901, p. 204.—RICHARDSON, 1902, p. 304.—VERRILL, 1902, p. 845, Fig. 232*b*.—RICHARDSON, 1905, p. 666 (descr.), Fig. 706 (after Sars).—RATHBUN, 1905, p. 46, check list, p. 4.—PAULMIER, 1905, p. 184, Fig. 58.—FOWLER, 1912, p. 226 (descr.), Pls. LXVII, LXVIII.—PRATT, 1916, p. 380, Fig. 610.—POPENOE, 1917,

p. 10, Figs. 5, 6.—KUNKEL, 1918, p. 251 (descr.), Fig. 84.—WAHRBERG, 1922*a*, p. 286.—LONGNECKER, 1924, p. 197.—VAN NAME, 1925, p. 467.—JOHANSEN, 1926*b*, p. 166.—GANDARA, 1926, p. 291.—COCKERELL, 1927, p. 232.—WALKER, 1927, p. 179.—MOREIRA, 1927, p. 194.—BLAKE, 1930, p. 279; 1931*a*, p. 354.—GIAMBIAGI, 1931, p. 417, Pls. I–III.—MOREIRA, 1932, p. 432.—PRATT, 1935, p. 443, Fig. 614.

Armadillo pilularis SAY, 1818, p. 432.—GOULD, 1841, p. 336.—DE KAY, 1844, p. 52.

Armadillo vulgaris LATREILLE, 1804, 'Hist. Crust.,' p. 48 (orig. descr.).—MIERS, 1877*a*, p. 665.

Uropodias bermudensis RICHARDSON, 1902, p. 304 (descr.), Pl. XL, figs. 59, 60.—VERRILL, 1902, p. 844.—RICHARDSON, 1905, p. 670 (descr.), Figs. 709 (see also VERHOEFF, 1907, pp. 462, 463).

"Body oblong oval, more than twice as long as it is broad, side-contours sub-parallel, dorsal face strongly vaulted and perfectly smooth. Cephalon, seen dorsally, broadly quadrangular, transversely truncated

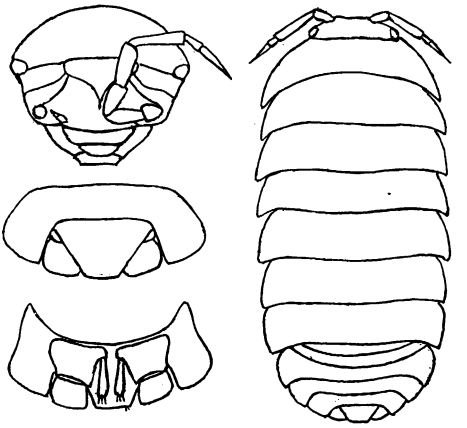

Fig. 157. *Armadillidium vulgare* Latreille. After Sars, 1899.

in front, lateral lobes comparatively small, rounded. Side-plates of 1st segment of mesosome with the posterior corner acute. Metasome broad, semicircular, scarcely occupying more than 1/5 of the length of the body; last segment much shorter than it is broad at the base and slightly tapering distally, tip transversely truncated. Antennae very short, scarcely exceeding in length 1/4 of the body, flagellum about the length of the last peduncular joint, and having its 1st articulation somewhat shorter than the 2nd. Last pair of legs with the ischial joint rather large, equalling in length the succeeding part of the leg. Copulative appendages of 1st pair of pleopoda in male with tips slightly divergent;

opercular plate of 2nd pair rather produced, but scarcely curved outwards at the tip. Uropoda with the outer ramus much shorter than the basal part, and very broad, its edge being continuous with the last segment. Colour of dorsal face somewhat variable, sometimes uniformly dark grey or nearly black, sometimes variegated with lighter patches generally arranged on the mesosome in 3 longitudinal rows, one median and 2 lateral; between them, moreover, on each segment is a group of more or less distinct flexuous stripes. Length attaining 14 mm." (Sars, 1899, p. 189.)

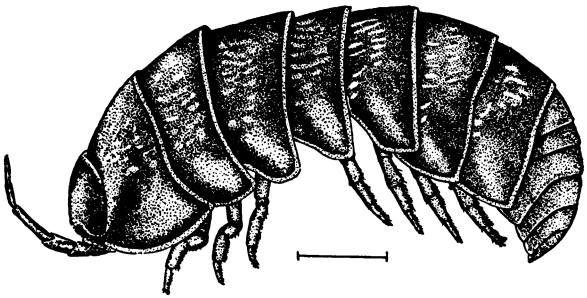

Fig. 158. *Armadillidium vulgare* Latreille. After Paulmier, 1905.

DISTRIBUTION.—Of Old World origin, but now found throughout much of the world inhabited by civilized man. Localities in the area covered by this work include Mexico City, Cayenne, São Paulo, Montevideo, Buenos Aires, Bermuda, Juan Fernandez. In the United States it occurs at least as far west as Colorado (Cockerell, 1927); it reaches

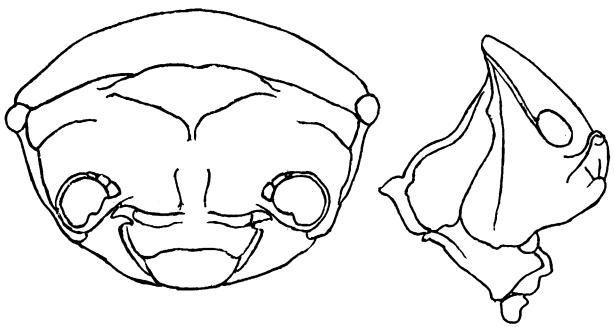

Fig. 159. *Armadillidium vulgare* Latreille. Adapted from Jackson, 1928.

southern Canada, but occurs there chiefly in greenhouses (Walker, 1927); Blake (1931) reports it only as far north as Salem in Massachusetts.

It is most numerous in the vicinity of human habitations, in gardens, greenhouses, etc., and is one of the few terrestrial isopods whose habits and numbers are such as to render it occasionally troublesome by damaging cultivated plants. It is one of the species in which the faculty and habit of rolling up into a ball is most highly developed, and is the one to which the popular name, "pill bug," is most often applied, though of course that name is given indiscriminately to all those that roll up.

Verhoeff, 1907, has pointed out that the genus *Uropodias* Richardson, 1902, p. 304, is based on a larval form, apparently of *Armadillidium*. After examining larvae of *A. vulgare*, which is reported from Bermuda, the type locality of *Uropodias bermudensis* (only species of the genus), I feel little hestitation in placing *U. bermudensis* among the synonyms of *Armadillidium vulgare*.

Armadillidium nasatum Budde-Lund, 1885

Figure 160

Armadillidium nasatum Budde-Lund, 1879, p. 6 (*nomen nundem*); 1885, p. 51 (descr.).—Blake, 1929, p. 11, Figs. 3, 4; 1931*a*, p. 354.

Armadillidium quadrifrons Stoller, 1902, p. 211 (descr.), Fig. 2.—Richardson, 1905, p. 668 (descr.), Figs. 707, 708.—Ross, 1914, p. 24.—Longnecker, 1924, p. 198.—Walker, 1927, p. 179.

"Oblonge ovale, convexiusculum, sublaeve, nitidum, raro et obsolete, maxime ad latera granulatum; medius truncus tuberculis laevibus et subdeletis; superficies tota densissime et minute punctata.

"Mala interior mandibularum penicillis 7–8.

"Antennae exteriores dimidiam corporis partem longitudine complentes; flagelli articuli subaequales, vel prior longior.

"Epistome e carina media supra in laminam subquadrangulam, marginem frontalem multo superantem, ascendens. Lamina margine superiore vix inciso, marginibus lateralibus utrinque sub lineam frontalem marginalem continuatis; frons post laminam excavatam fove praedita. . . .

"Color griseus, uniformis, vel saepe maculis pallidis, maxime in exemplis junioribus, in lineas tres vel quinque longitudinales pulchre marmoratus.

"Long. 10–13 mm. Lat. 4.5–6 mm. Alt. 2.3–2.7 mm." (Budde-Lund, 1885, p. 51–52.)

The large, squarish, forwardly extending lobe into which the epistome is produced distinguishes this species from *A. vulgare.*

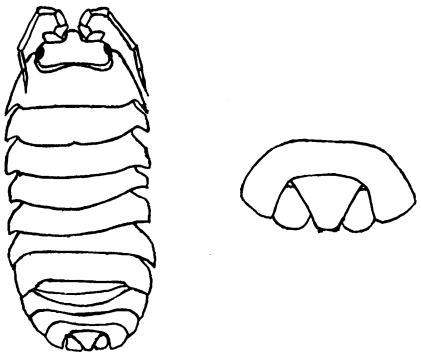

Fig. 160. *Armadillidium nasatum* Budde-Lund. After Blake, 1928, and Richardson, 1905.

DISTRIBUTION.—A native of southern Europe; type locality near Rome, Italy. In America apparently confined to hothouses and warmed buildings, where however it may occur in abundance. Reported from Schenectady, N. Y. (Stoller); Cambridge, Mass., and Middletown, Conn. (Blake); London, Ontario (Ross); Mt. Pleasant, Iowa (Longnecker). The American Museum of Natural History has a specimen found in a storage warehouse in New York City.

ELUMA BUDDE-LUND, 1885

This genus is separated from *Armadillidium* by the following characters:

"The cephalic lobes are more feebly developed and the epistome is keeled in the middle line, and has a sloping dorsal portion, and auricula-shaped prominences above and lateral to the antennal sockets; the eyes are small and simple; the pleural plate of the first mesomatic segment exhibits a notch on the posterior angle formed by the protrusion of the coxopodite; finally the uropoda extend beyond the telson." (Collinge, 1922, p. 104.)

Type: *E. purpurascens* Budde-Lund, a European species which is regarded as identical with the following species of Miers:

Eluma caelata (Miers), 1877

Figures 161, 162

Armadillidium caelatum MIERS, 1877*a*, p. 665 (orig. descr.), Pl. LXVII, figs. 3–3*b*.—BUDDE-LUND, 1879, p. 6.—STEBBING, 1893, p. 434.

Eluma purpurascens BUDDE-LUND, 1879, p. 6 (*nomen nudum*); 1885 (descr.), p. 48 (mentions, p. 49, *A. caelatum* Miers, as probably not distinct from this).—DE BORRE, 1886, p. cvii.—DOLLFUS, 1896*e*, p. 357.

Eluma caelatum COLLINGE, 1922 (new descr.), p. 104, Pl. VIII, figs. 1–12.—VAN NAME, 1925, p. 467.—ARCANGELI, 1930, p. 83.

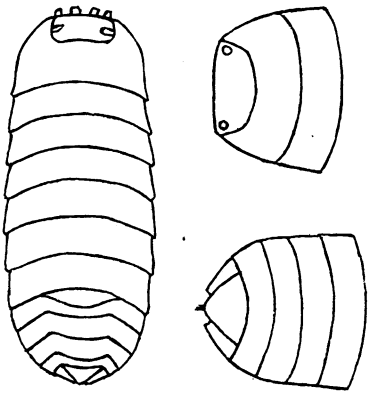

Fig. 161. *Eluma caelata.* Enlarged from Miers' (1877) small figures.

Miers' description, which is not a satisfactory one, is here quoted. His figures are small and show very little.

"Convex, very finely and closely punctuated and pubescent. Head transverse-oblong, closely encased in the first segment of the body,

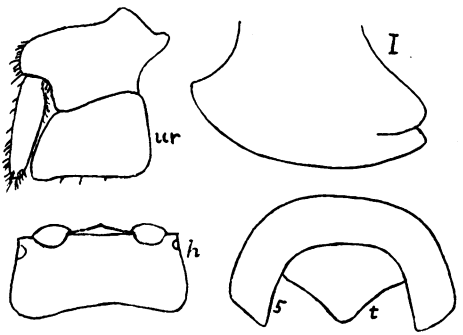

Fig. 162. *Eluma caelata.* Adapted from Collinge, 1922. From specimens from Ireland.

with the anterior margin reflexed, more prominent in the centre, and slightly sinuated toward the antero-lateral angles, which are not prominent. Eyes minute, placed close to the antero-lateral angles. First segment of the body somewhat larger on the sides than the rest, with

the postero-lateral angles acute, the posterior margin slightly excavate; following segments with the posterior margins nearly straight. Segments of the tail short; third to fifth bent backward on the sides; terminal segment broader than long, triangular. Terminal joints of the uropoda transverse when viewed from above. External antennae with the last two joints (flagellum) together about as long as, but more slender than, the preceding joint, the penultimate much shorter than the terminal joint. Colour generally dark brown. Length about 4 lines; breadth 2 lines.

"Hab.—Cayenne."

DISTRIBUTION.—Cayenne, French Guiana, type locality (Miers). Budde-Lund, 1885, also reports having seen specimens from Cayenne. It is, however, according to the opinions of Budde-Lund, 1885, and of Collinge, 1922, identical with *Eluma purpurascens* Budde-Lund, 1885, an Old World form occurring in the Canaries, Azores, Madeira, western Algeria, Spain, Portugal, parts of France and Ireland.

Except for Budde-Lund's apparent acceptance of the Cayenne record, we might be inclined to suspect that the locality was an error and question whether this is an American species at all, or to doubt the identity of the Old World and American forms, especially as Miers' description is so brief and his small and crude figures (here reproduced in outline much enlarged) are so inadequate. Arcangeli, 1930, expresses disbelief in the identity of *caelata* and *purpurascens*, and in the occurence of the latter in America.

Cubaridae

(Syn. Armadillidae)

The Cubaridae are generally characterized by a highly arched body adapted for rolling up, and by having well-developed epimera so shaped as to form a close fit with the parts with which they come in contact when rolled. In the more highly specialized forms, such as *Cubaris* and its allies, there are, on the lower aspects of the anterior segments, epimeral or coxopodite ridges or processes to lock together and support more firmly the segments when the body is in the rolled position. The tight fit of their segments and the effective adaptation of the pleopoda for breathing dry air permits of such effective conservation of moisture that many species can maintain themselves in the semi-desert areas of the tropical and warm-temperate zones.

The head is short from front to rear, well set back into the thorax and with its somites so well consolidated that their limits are often difficult to determine; in most genera the antennae have the articles of

the flagellum reduced to two, while the uropoda have a large broad basal segment which performs a share in inclosing the body when rolled, but the internal, and especially the external branches, are greatly reduced or vestigial. All of these are evidences of specialization and advanced phylogenetic development, and in the adaption of the pleopoda for respiration purposes advanced development is also shown, all five pair of pleopoda having, in the typical genera of the family, systems of tracheae in the external plates. These open in each plate by an aperture in a pocket-like furrow near its external margin, the development of the tracheae being so extensive that the respiratory function of the inner plates of the pleopoda becomes more or less secondary in this group.

In the present work the majority of the American genera characterized by a highly arched body and well-developed power of rolling up have been placed in this family, but especially with the present incomplete knowledge of the characters of some of the genera it is difficult to know were to draw the line between the Oniscidae and the present family. In the case of some of the less specialized genera, as *Scleropactes* and *Sphaeroniscus*, there is much to be said in favor of placing them in the Oniscidae rather than here. See also remarks under the genus *Circoniscus*.

The Old World genus *Eubelum* and its only known American ally *Ethelum*, often regarded as a separate family (Eubelidae), are also included here in the present work.

SCLEROPACTES BUDDE-LUND, 1885

"Flagellum antennarum 3-articulatum. Pleurae capitis concretae; linea marginalis verticalis ad oculos producta.

"Trunci segmentum primum post intergrum.

"Pleopodum rami operculares nullis tracheis. Telsum breve rotundate triangulum, epimeris segmenti paenultimi multo brevius. Uropodes breviores vel mediocres. Exopoditum mediocre teretiusculum, scapi lateri interiori insertum, scapo non longius, endopoditum longum, scapo longius.

"Corpus valde convexum in globum contractile.

"Oculi congregati, ocelli sat numerosi. Lamina exterior maxillae prioris paris dentibus septem integris munita. Antennae, corporis dimidium aequantes vel paulum superantes, scapi articuli ad apicem versus sensim longitudine crescentes, articulus 4. gracilior quam 2. sed fere duplo longior. Epistoma convexum lineam marginalem frontalem continuam formans, post lineam marginalem sulco transverso a fronte discretum.

"Trunci segmenta pronotum magnum dimidio dorso segmenti aequale vel longius habent." (Budde-Lund, 1904, p. 46.)

Type of the genus *S. concinnus* Budde-Lund, 1885 (see below).

The members of this genus are superficially much like *Sphaeroniscus* Gerstaecker, both in general appearance and in the structure of the uropoda, but may be at once distinguished by the groove or sulcus between the forehead and the upper border of the epistome. This groove curves upward on the forehead along the inner border of each eye. No coxopodite sulcus ridge or process is present, and the rear angle of the first thoracic segment is not cleft. See remarks under the family Cubaridae.

Scleropactes concinnus Budde-Lund, 1885

Figure 163

Scleropactes concinnus BUDDE-LUND, 1885, p. 240 (orig. descr.); 1904, p. 47, Pl. VII, figs. 1–10.—VAN NAME, 1926, p. 9.

The original description is as follows:

"Oblonge ovalis, valde convexus, nitidus, laevis, vix punctatus vel granulatus.

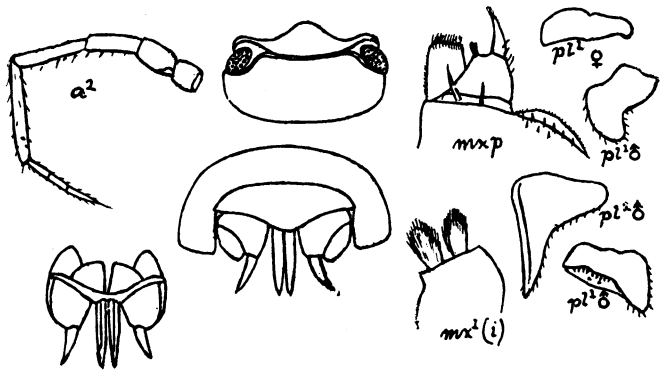

Fig. 163. *Scleropactes concinnus* Budde-Lund. Adapted from Budde-Lund, 1904.

"Antennae exteriores hirsutae, corpore dimidio vix breviores; flagellum scapi articulo quinto vix brevius; flagelli articuli ad apicem sensim longiores; articulus ultimus seta apicali longa instructus. Epistoma medio convexum, ad longitudinem sinuate subbicarinatum; linea marginalis frontem non superans, ad latera subbiramosa; sulcus frontalis profundus, utrinque post oculos retroductus.

"Trunci annuli priores margine posteriore subtransverso vel utrinque levissime sinuato; annuli posteriores margine posterior medio leviter sinuato; epimera parva, angulis posticis omnium annulorum obtusis, rotundatis, processu laterali nullo.

"Caudae annuli duo priores breves; annuli tres sequentes mediocres, epimeris latis tetragonis. Annulus analis triangulus, triplo latior quam longior, epimeris annuli praeanalis paulisper brevior, apice obtuso supra planus vel in apice paulisper impressus. Articulus basalis pedum analium magnus, annulum analem superans, latere exteriore alato, margine carinato, apice acute producto, margine interiore plano, tetragono. Ramus terminalis exterior teres, brevis, stiliformis; ramus interior substiliformis, longus, apicem rami exterioris aequans.

"Color griseus, maculis albidis in lineam longitudinalem in utroque latere digestis, in medio trunco caudaque crebro albido irroratus; pedes albidi; antennae griseae, flagello et dimidio articuli quinti scapi albidae.

"Long. 11–13 mm. Lat. 4.5–5 mm. Alt. 2.75–3 mm."

LOCALITY.—Tambillo, Ecuador (on the west slope of the Andes west by south of Quito, not in Peru, as first stated by Budde-Lund). Several specimens in Warsaw Museum (Budde-Lund).

Scleropactes incicus Budde-Lund, 1885

Scleropactes incicus BUDDE-LUND, 1885, p. 241 (orig. descr.); 1904, p. 47.

Described by Budde-Lund as differing from *S. concinnus* in the following respects:

"Superficies minutissime praesertim in medio trunco granulata. Epistomatis linea marginalis frontem paulisper superans, utrinque sublobate producta. Caudae annulus analis epimeris annuli praeanalis minus convergentibus paulum brevior. Long. c. 6 mm."

LOCALITY.—Peru. Described from a single imperfect specimen.

Scleropactes zeteki Van Name, 1926

Figures 164, 165

Scleropactes zeteki VAN NAME, 1926, p. 6 (orig. descr.), Figs. 6–13.—ARCANGELI, 1930*a*, p. 2.

See also remarks following the description below.

The following statements are taken from the original description:

"Body surface covered with minute slightly elevated tubercles arranged in indistinct transverse rows; on the dorso-lateral regions of the thorax the tubercles are larger and often more or less confluent. In

many cases the tubercle bears a short, stiff setose hair on its summit. These hairs are also scattered elsewhere. . . .

"Front outline of head transverse and slightly sinuous when seen from above, with well-marked lateral angles. The upper border of the epistome is somewhat unevenly arched when seen from in front and is upturned to form a projecting border to the front of the head, producing

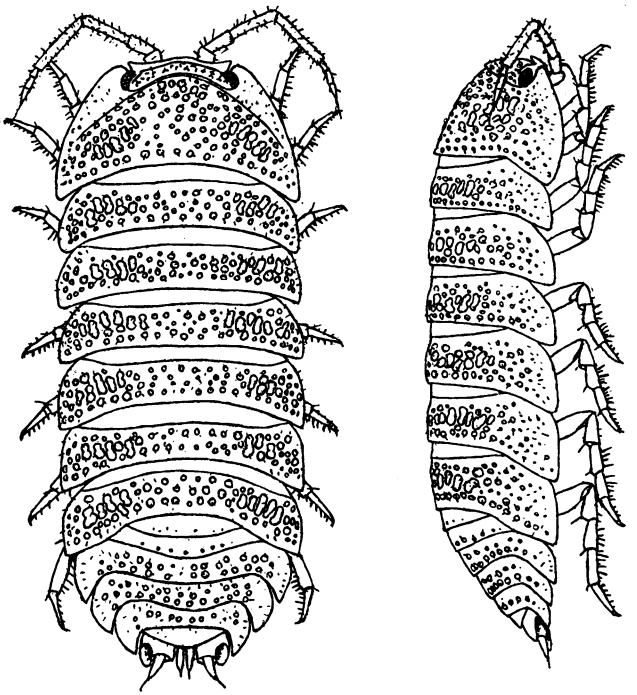

Fig. 164. *Scleropactes zeteki* Van Name. From Van Name, 1926.

a very deep, narrow furrow between itself and the base of the forehead. This furrow, however, does not extend the whole width of the front but curves upward on the forehead along the inner border of each eye.

"Eyes oval, oblique of medium size with fairly numerous ocelli. Their surface is very convex and prominent. Second antennae short (not reaching the third segment when drawn back) and weak, somewhat hairy and provided with a flagellum of three articles, the first being rather short and the articulation between the last two being rather indistinct and probably not movable. The last article is tipped with a rather short bristle. . . .

"Legs rather weak and slender with fairly long sharp and slender spines. . . .

"Telson having the form of an exceedingly wide, short triangle much rounded at the tip. Basal joints of uropoda wide and extending much beyond the telson; their dorsal surface has a large, sharply defined excavation on the posterior lateral part; the outer branch is short, curved, and tapering and arises from a conspicuous excavation

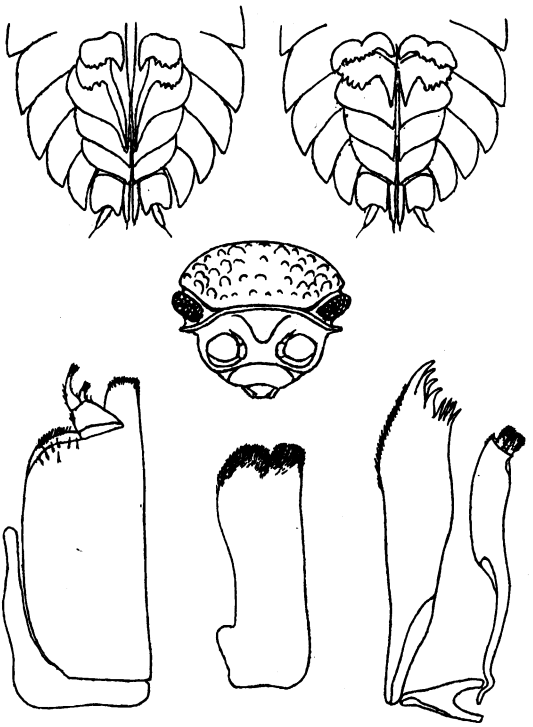

Fig. 165. *Scleropactes zeteki* Van Name. From Van Name, 1926.

in the thick terminal margin of the basal joint; the inner branch arises far forward on the ventral aspect of that joint close to the median line. It is straight and long and projects nearly half its length beyond the end of the telson, lying alongside its fellow of the opposite side in the gap between the somewhat widely separated basal joints. . . .

"Color.—Dull slaty gray with the usual small yellowish markings and larger yellowish spots on the segments at the junction of the epimeral

with the main parts of the segments, and in the median region of the back. The epimera are also lighter colored, giving the appearance of a broad light border around the body. The legs and lower parts are yellowish (unpigmented). The terminal half of the fifth joint of the antennae is abruptly light colored.

"Length of the largest individuals (females) about 15 mm."

LOCALITY.—Barro Colorado Island, Gatun Lake, Canal Zone, common under logs and dead leaves in the forest. Type in the American Museum of Natural History (Cat. No. 5348).

Allee, 1926, pp. 448, 453, 456, reports a "*Sphaeroniscus* sp." from Barro Colorado Island and from the monkey cap palm forest near Fort Sherman, Canal Zone, which very likely may be this species. It is possible that the specimen of *Sphaeroniscus* from Darien, "in too poor condition to be described," reported by Dollfus, 1896*b*, p. 2 (Van Name, 1926, p. 3), may also belong here instead of in *Sphaeroniscus*.

Scleropactes tatei, new species

Figures 166, 167

Body highly arched and compactly articulated; the epimeral ends of the segments extend down almost vertically, so that in a dorsal view the body is of rather narrow elliptical outline. It narrows also considerably toward the front and rear ends.

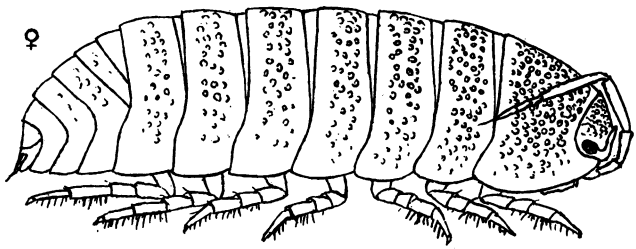

Fig. 166. *Scleropactes tatei*, new species.

Dorsal surface of body in general smooth and even, though on considerable magnification it is seen to be covered with very low smooth pustule-like tubercles which are best developed on the head and anterior half of the thorax. Toward the rear end of the body they become less well defined, almost disappearing on the abdomen.

Front outline of head sinuous and nearly transverse when seen from above. Upper border of epistome arched when seen from in front. It forms a strongly upturned border to the head between the eyes but is not appressed to the forehead, from which it is separated by a very deep but narrow groove. Near the eyes this groove turns upward on the forehead and curves along the inner border of each eye,

becoming gradually narrower and finally closing altogether. The parts of the head bearing the eyes are separated from the forehead by this groove but they are not separated from the epistome by any conspicuous line of demarcation. Antennae rather slender and moderately long. Their flagellum is shorter than the last joint of the peduncle. It is tipped with a bristle and has three articles of which the last is somewhat the longest. Eyes rather small, ocelli about fifteen.

Lateral border of first thoracic segment not bent or curved outward, though under considerable magnification an extremely narrowed bead or thickened margin is visible. It bears no groove or sulcus, and no coxopodite process is present on any segment.

Telson very broad and short. Its exterior surface has a shallow median depression near the tip. The external rear angle of the basal segment of the uropoda is rounded off and there is a large shallow longitudinal groove-like depression external

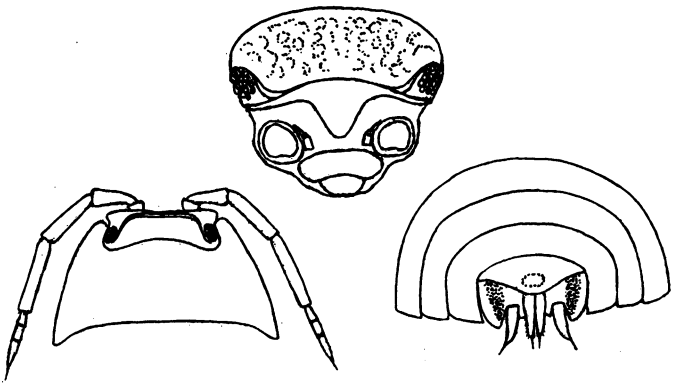

Fig. 167. *Scleropactes tatei*, new species.

to the origin of the outer branch, which is inserted in a deep notch in the posterior, margin, and is stouter than the inner branch, though not so long, and of tapering somewhat curved form. Both branches bear conspicuous terminal bristles.

Color.—Brownish or brownish gray above with yellowish markings; legs and under parts yellowish.

Length of type (a female) about 8 mm.

LOCALITY.—The type (Cat. No. 6516) and another considerably smaller female specimen, which are in the American Museum of Natural History, were collected on Takinon Mountain, Naupon, Ecuador, at an altitude of 13,000 feet, by Mr. George H. Tate, for whom the species is named.

Scleropactes tristani Arcangeli, 1930

Figure 168

Scleropactes tristani ARCANGELI, 1930*a*, p. 8 (orig. descr.), Fig. 2; 1931*a*, pp. 11, 16.

Body rather elongate oval, very convex, especially in the fore part, but not capable of completely rolling up; translucid, without granulations, and covered with very fine short setae not very thickly distributed.

Head entirely set back in the thorax; two and one-half times as wide as long; its rear margin slightly but distinctly concave in the middle and its front margin presenting a broadly curved outline with a slight inward curvature of the median region, due to a reflexion of the apex of the shield formed by the epistome, which is similar to that of *S. estherae*. Eyes entirely wanting. The antennae are short, not reaching the rear of segment II when drawn back.

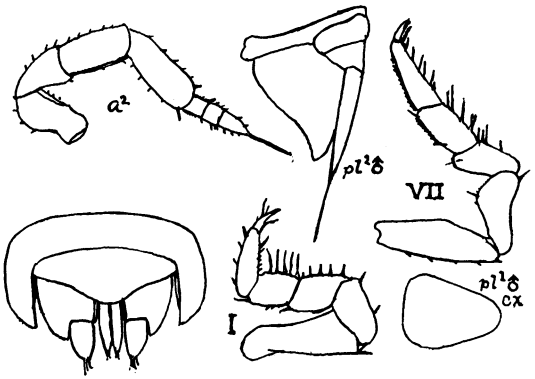

Fig. 168. *Scleropactes tristani* Arcangeli. Adapted from Arcangeli, 1930*a*.

The abdominal segments 3 to 5 have the epimera directed backward and fairly wide, but not as acute as in *S. estherae*. The telson is wide and short with a rounded apex and concave sides. It is much shorter than the basal segments of the uropoda and the tip of the fifth abdominal segments. The exposed part of the basal segments of the uropoda has the external border convex and ending in a prominent tooth or point external to the insertion of the exopodite which is conical and directed straight backward. The endopodites are narrow but long, inserted close together and reach nearly as far as the tips of the exopodites. Both branches are tipped with a tuft of short setae. No tracheae in the external plates of the pleopoda. Additional details are given in Arcangeli's description.

Color whitish; unpigmented.

Length, 3.5 mm.; width about 2 mm.

DISTRIBUTION.—Costa Rica. Many specimens collected at various

points; Puente de las Mulas (first mentioned locality), San José, San Juan, Apaican, etc. (Arcangeli).

Scleropactes estherae Arcangeli, 1930

Figure 169

Scleropactes estherae ARCANGELI, 1930*a*, p. 6 (orig. descr.), Fig. 1.

Body elongate oval, very convex, especially in the anterior part; slightly rugose above, capable of rolling up almost completely, and bearing a few short subtriangular setae, especially on the fore part.

Head almost entirely set back in the thorax, two and one-half times as wide as long; its frontal outline, seen from above, sinuously convex. The lateral lobes are small and rectangular. Eyes relatively large, prominent, with ten large ocelli. The upper median part of the

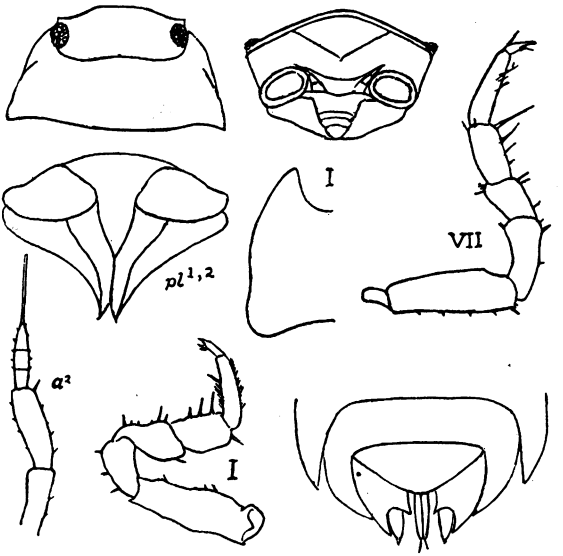

Fig. 169. *Scleropactes estherae* Arcangeli. Adapted from Arcangeli, 1930*a*.

epistome forms a large transverse diamond-shaped slightly raised shield between which and the small lateral lobes there are deep depressions. Second antennae quite short, not reaching the rear of the second segment when drawn back. The terminal article of the flagellum is a little the longest, the middle one a little the shortest of the three. The terminal one bears a long bristle. The first thoracic segment has nearly vertically descending sides, and a slight V-shaped depression on the median anterior part.

The third to fifth abdominal segments have long, acute epimera which are curved straight backward in segments 3 and 4 but are somewhat convergent in segment 5. The uropoda have the basal segment large, longer than wide and a little curved toward the median line so that the outer margin is convex, the inner concave. The fairly large conical exopodite occupies a deep semicircular notch in the inner distal part of the margin of the basal segment and extends beyond its end. The endopodites are quite long and slender, close together, and reach as far as the ends of the exopodites. Telson short, widely triangular, rounded at the apex.

Color.—Grayish chestnut above with whitish markings; the pigment is present to a considerable extent on the lower parts and legs also.

Length, 5 mm.; width about 2.5 mm.

LOCALITY.—La Palina, Costa Rica, one male specimen.

Scleropactes cavifrons Jackson, 1928

Figure 170

Scleropactes sp. JACKSON, 1928*a*, p. 586 (*S. cavifrons* on p. 588, see below), Fig. 16.

Jackson describes and figures the head of a *Scleropactes* to which he does not himself formally attach a specific name. He says that the

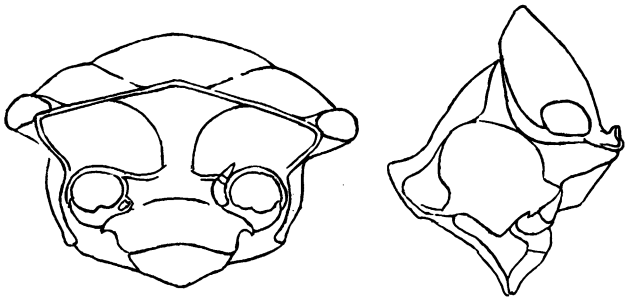

Fig. 170. *Scleropactes cavifrons* Jackson. Adapted from Jackson, 1928*a*.

specimen was in the British Museum among Budde-Lund's material and was labeled *S. cavifrons*, but that no description of it seemed to have been published.

From his figure (here reproduced in outline) and the few statements he makes, the species is apparently close to *S. estherae* Arcangeli. He gives no locality, but presumably it is American.

It would seem that the publication of his descriptive statements and figure in connection with Budde-Lund's proposed name must be regarded as giving validity to the latter.

SPHERARMADILLO RICHARDSON, 1907

Quite close to *Sphaeroniscus* Gerstaecker, 1854, in most characters, but apparently sufficiently distinguished by the absence of eyes and by having the coxopodite ridge developed along much of the length of the under side of the margin of the first thoracic segment. Flagellum of antennae with three articles.

Spherarmadillo schwarzi Richardson, 1907

Figure 171

Spherarmadillo schwarzi RICHARDSON, 1907, p. 448 (orig. descr.), Figs. *a–g*.

The following statements from the description are given to supplement the figures reproduced from Richardson's article.

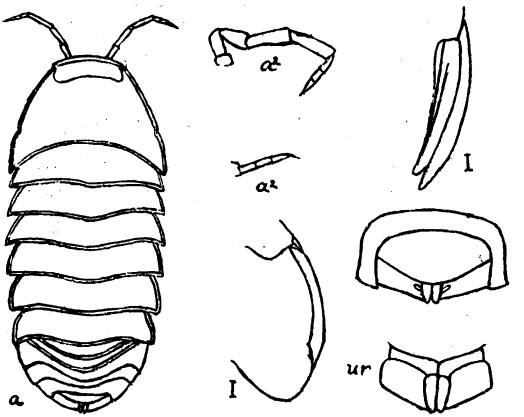

Fig. 171. *Spherarmadillo schwarzi* Richardson. Adapted from Richardson, 1907.

Head with the front straight and margined. The epistome has a slight shield-like convexity. There is no trace of eyes. The flagellum of the second antennae is composed of three articles, the middle one of which is slightly shorter than either of the others, which are subequal.

The lateral parts of the first segment are slightly produced backward in rounded lobes. Epimera or coxopodites are present on the underside and extend in the form of a wide band along the entire lateral margin almost to the posterior margin and are cleft posteriorly by a rather deep fissure. The form and position of the coxopodites give a thickened

appearance to the lateral margin. Epimera are not present on any of the following thoracic segments.

Color yellow with numerous arborescent markings of dark brown.

Length, 50 mm.; width, 22 mm. (See remarks below.)

LOCALITY.—Livingston, Guatemala. Type and only specimen in U. S. National Museum (Richardson).

The dimensions given in the description are extraordinary, and are evidently incorrect. The figure *a* (the only one from which the size can be well determined) given in the explanation as enlarged three times indicates that the length of the specimen was 18.6 mm., quite a large size.

SPHAERONISCUS GERSTAECKER, 1854

This genus was given a brief Latin diagnosis (here repeated) by Gerstaecker (1854, p. 314), followed by a more lengthy characterization in German which is here translated in part:

"Antennae externae 9 articulatae, seta terminali instructae. Annuli thoracici anteriores lateribus valde attenuati, apice rotundati. Annuli abdominis duo anteriores ceteris non breviores; ultimus subtriangularis. Pedes spurii ultimi paris articulo terminali externo minuto, postico; interno elongato."

"The head is short and wide with the anterior border much turned up; the eyes relatively small, oval and placed near the rear angles. Flagellum of outer antennae of three articles which become successively thinner; the last is tipped with a long bristle. Mouth parts not different from those of *Cubaris* Brandt.

"The thorax, which is adapted for rolling up, is of structure similar to that in *Cubaris*, but exhibits certain differences. The first segment has a widely set off and more upturned border; on the under side this border, which is formed by the union of the upper and lower plates, is not sharply defined but widely flattened, so that it forms a flat surface set off at right angles. However, this surface does not fully reach the rear angle, but ends somewhat farther forward than the actual lateral border does, forming in doing so a blunt, posteriorly projecting tooth, so that in rolling up the second segment can fit under the first.

"The last pair of appendages consist of a large four-sided basal joint which completely fills in the space between the last two segments and two branches. Of these the outer is very small, oval, visible from above, and inserted, not in the middle of the inner border as in *Cubaris*, but in a notch in the inner rear corner; the inner branch is very long, laterally compressed, with a sharp upper and lower margin, and reaches to the hind edge of the basal segment.

"Type of the genus: *S. flavomaculatus* Gerstaecker."

Neither Gerstaecker's long description nor his figures give us a fully satisfactory idea of this genus. It is possible that as here used it is being taken in too comprehensive a sense and may require division.

Sphaeroniscus flavomaculatus Gerstaecker, 1854

Figure 172

Sphaeroniscus flavomaculatus GERSTAECKER, 1854, p. 315 (orig. descr.), Pl. II, figs. 2–2*c*.—STUXBERG, 1875, p. 44; BUDDE-LUND, 1879, p. 7; 1885, p. 45.—STEBBING, 1893, p. 434.—RICHARDSON, 1912*c*, p. 31.

Gerstaecker describes this species as follows:

"Long., 7 lin.

"Oblongo-ovalis, convexus, laevis, nitidus, fuscus, capite processibusque annulorum lateribus pallidioribus, seriebus duabus macularum dorsalium, marginibus annulorum posticis, lineaque media pallide flavis."

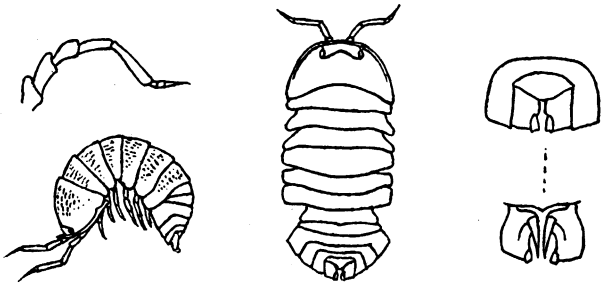

Fig. 172. *Sphaeroniscus flavomaculatus* Gerstaecker. Adapted from Gerstaecker, 1859.

"The body is elongate oval semicircularly arched, smooth and shining. The outer antennae do not reach to the rear border of the first segment when drawn back; they are light brown, the flagellum whitish. The head is nearly four times as wide as long, with a vertically bent up, straight front border, and a deeply concave rear border; the rear corners are rounded, the surface somewhat uneven, gray-brown, irregularly spotted with white. The first thoracic segment is rather wider than the rest of the body, twice as long as the other segments, with the lateral border widely turned out and up toward the anterior end. The anterior corners fit the sides of the head exactly and are rounded like the rear corners.

"The succeeding thoracic segments are of equal length in the median line, the lateral ends of the first three are narrowed with a rounded

tip, those of the former somewhat wider, yet rounded, those of the last two nearly rectangular. Of the abdominal segments the two first are a trifle wider than the next three, the lateral processes of the latter are somewhat widened rectangularly and toward the outside. The last segment is short, triangular, with rounded tip and concave sides; with a transverse impression halfway toward the end.

"Ground color of upper parts blackish brown; epimera somewhat lighter with two longitudinal rows of large oblong spots; the median line and the rear border of the individual segments are pale yellow. The underside and legs are whitish." (Translated from original description.)

LOCALITIES.—New Granada (Gerstaecker); between Boca del Monte and Tanbo, Colombia, 1800 meters (Richardson).

Sphaeroniscus frontalis Richardson, 1912

Sphaeroniscus frontalis RICHARDSON, 1912*c*, p. 31.

Richardson's statement regarding this form is as follows:

"This species is very close to *Sphaeroniscus flavomaculatus* Gerstaecker, but differs in not having the epistome produced to a great distance beyond the frontal margin of the head; in having the first segment of the thorax with the lateral margin not rolled back so much and not so wide as in *S. flavomaculatus*, and in not having the lateral margins of the segments lighter in color."

Color.—Orange-brown or dark gray, yellow markings.

LOCALITIES.—Near Viota, Colombia, 1200 and 1800 meters.

Sphaeroniscus portoricensis Richardson, 1901

Figure 173

Sphaeroniscus portoricensis RICHARDSON, 1901, p. 573 (orig. descr.), Fig 34; 1905, p. 662 (orig. descr. repeated), Figs. 703, 704; 1907, p. 449.—PEARSE, 1917, p. 3.—VAN NAME, 1925, p. 466.

Richardson's description in full is as follows:

"Body oblong, very convex, contractile into a ball. Surface perfectly smooth. Head set in first thoracic segment; front straight; epistoma forming a triangular shield. Eyes very small. Antennae with flagellum composed of three joints.

"First thoracic segment twice as long as head and longer than any of the other segments. Coxopodites not distinct from segment.

"First two abdominal segments with the lateral parts concealed, the three following ones continuing the outline of the body. The termi-

nal segment is twice as broad as long, very short, widely rounded posteriorly. The basal joints of the uropoda are square, extending the greater part of their length beyond the terminal segment. The external branch is inserted at the inner post-lateral angle of the basal joint and extends downward. The internal branch extends much beyond the last abdominal segment, is longer than the basal joint of the uropoda, and reaches the tip of the external branch.

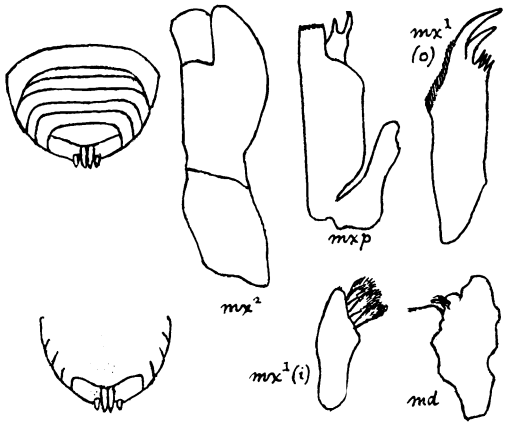

Fig. 173. *Sphaeroniscus portoricensis* Richardson. Adapted from Richardson, 1905.

"Color.—Reddish brown with markings of yellow."

Localities.—"Four specimens were taken by Dr. C. W. Richmond at El Yunque, Puerto Rico, at an altitude of 2800 feet." Type in U. S. National Museum (Richardson).

"Forty-three specimens were taken from bromeliads on the summits of sand hills on July 30, and twenty-one from an abandoned termite's nest on a mourie, August 20, near Dunoon, British Guiana" (Pearse). Prof. Pearse does not give any description or figures, nor state that he made any direct comparison of specimens from the two regions.

Sphaeroniscus guianensis, new species

Figures 174, 175, 176A

Body as seen from above very broad, considerably arched, broadly rounded in front and rounded in the arc of a smaller circle behind. Lateral ends of the segments considerably developed; in the abdominal region, especially, they increase the apparent width of the body by inclining obliquely outward. In the thoracic region they are more nearly vertical except in the anterior part of the first segment, where the

border is flared or curved outward conspicuously. Body surface smooth and even, not pubescent; exposed parts of segments not much raised above part overlapped by the segment next in front.

Head very small and short, its front outline convex when seen from above; there is a small slightly projecting lobe under each eye. Head so deeply set back into the thorax that it projects little beyond the general curve of the front of the body.

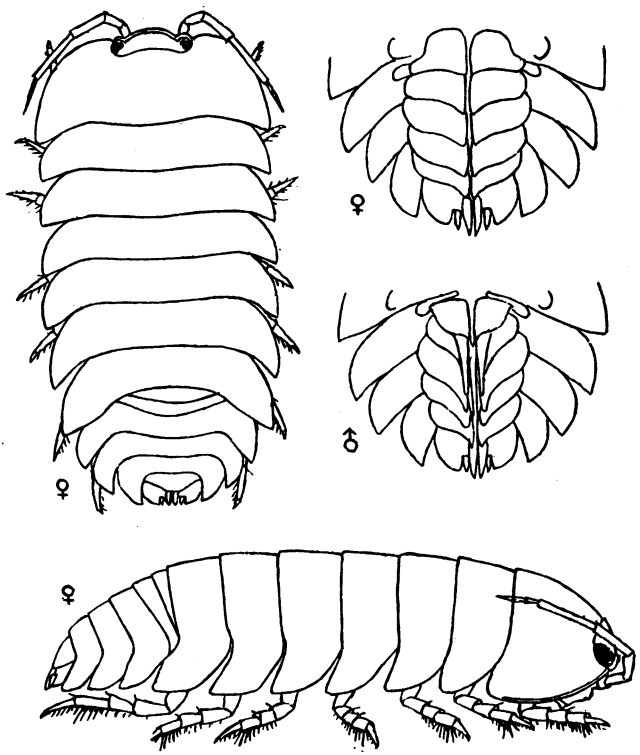

Fig. 174. *Sphaeroniscus guianensis*, new species.

The upper border of the epistome is prominent and upturned but not appressed to the forehead, so that a furrow is formed between it and the median anterior surface of the head. Seen from in front the upper border of the epistome describes a curve gently convex downward between the eyes and forms a distinct, sharply defined, upwardly directed angle near the inner lower corner of each eye. Eyes rather large, with about twenty-five ocelli arranged in four oblique rows. Second antennae of only moderate length and stoutness; the flagellum more than half as long as the last joint of the peduncle and very slender, with three articles, the terminal one somewhat the longest.

First segment of the thorax with the lateral borders curved or flared outward, but to a diminishing extent toward the rear angles, which are somewhat produced backward and slightly rounded off at the extreme tip. Its inferior margin is curved and bordered by a very narrow bead or thickened edge, so slight that it is noticeable only under magnification. No sulcus on its inferior aspect; no coxopodite developed on any segment. The second and third segments also have the extreme tip of the rear

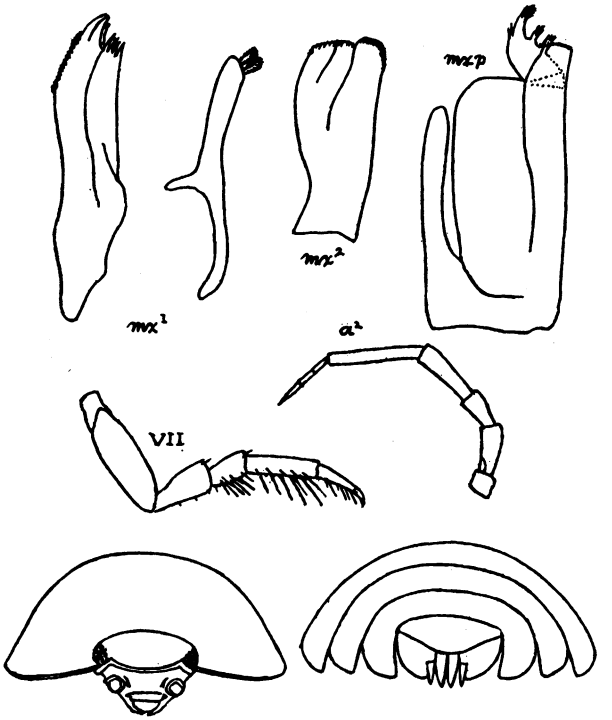

Fig. 175. *Sphaeroniscus guianensis*, new species.

lateral angle rounded off narrowly. The second to seventh (inclusive) segments of the thorax as well as the third, fourth, and fifth of the abdomen have the lateral ends considerably extended, their anterior corners being rounded off and the posterior ones sharp, except as above noted, and extended backward to an increasing degree as the posterior end of the body is approached. The seventh thoracic segment is an exception, being less extended back than the sixth.

Telson very broad and short, its shape approaching that of an inverted triangle blunted at the apex. The position and form of the uropoda and their branches are such that together they fill in most of the space behind the telson and between the epimeral ends of the fifth abdominal segment; the external rear angles of the broad

basal segments of the uropoda, however, are much rounded off. Their branches, which are of elongated tapering form, extend a trifle beyond the end of the basal segments.

Upper parts marbled or irregularly mottled with brown or dark grayish brown pigmented areas and pale yellowish unpigmented areas; under moderate magnification the pigmented parts are seen to be not continuous but composed of more or less separated dark spots of small size.

The largest specimen, a female, would probably measure 13 to 14 mm. long if it could be straightened out.

LOCALITIES.—Tumatumati, British Guiana, August, 1912, 1 large female (type). Kaieteur, British Guiana, August 11, 1911, Dr. F. E. Lutz, coll., 1 male, 1 female, and one incomplete specimen. Laudat, Dominica, W. I., August 6, 1911, Dr. F. E. Lutz, coll., 1 female and one mutilated specimen; Tacoba, British Guiana, Oct. 10, 1922, 1 specimen, Mr. Herbert Lang, coll. All in the American Museum of Natural History (type, Cat. No. 6527).

Sphaeroniscus tukeitanus, new species

Figures 176B, 176C

This is so close an ally of *S. guianensis* that a full description would be largely a repetition of what has been said regarding that species, but it can be distinguished at once by the fact that although the thoracic segments have their lateral ends

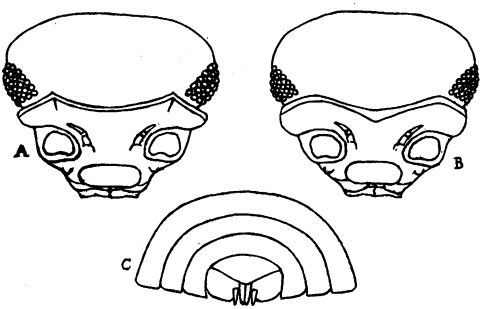

Fig. 176. A, *Sphaeroniscus guianensis*, new species, front of head. B, C, *Sphaeroniscus tukeitanus*, new species, front of head and rear end of body.

rounded off as in *S. guianensis*, the third, fourth, and fifth abdominal segments and the basal segment of the uropoda have the ends broadly truncated, filling out the even curvature of the outline of the rear end of the body. There is also an easily recognizable difference in the upper border of the epistome which does not present a sharply defined angle near the inside border of the eye, but only a slight upward curve.

Other minor differences are that the forehead is a little higher, the eyes smaller though with about the same number of ocelli, the body apparently a little more highly arched, and the lateral ends of the segments more developed, so that the apparent size of the body is greater in proportion to its actual bulk.

Color slaty gray above with a narrow yellowish edging to each segment and small irregular bars and rounded spots of yellowish on the lateral regions of the back. Under parts and legs yellowish.

Length of largest specimen (a female) about 16 mm.

LOCALITIES.—Tukeit, British Guiana, July 16, 1911, Dr. F. E. Lutz, coll., 1 female (type), 1 male. Kaieteur, British Guiana, August 4, 1911, Dr. F. E. Lutz, coll., 1 female. Specimens all in the American Museum of Natural History (type, Cat. No. 3542).

Sphaeroniscus colombiensis Pearse, 1915

Figure 177

Spaeroniscus colombiensis (misprint for *Sphaeroniscus c.* PEARSE, 1915, p. 548).
Sphaeroniscus colombiensis PEARSE, 1915, p. 547 (orig. descr.), Fig. 8.

Described by Pearse as follows:

"Body oblong, very convex, contractile into a ball; length 16 mm., width 5.8 mm. Dorsal surface marked with very minute pearly granules

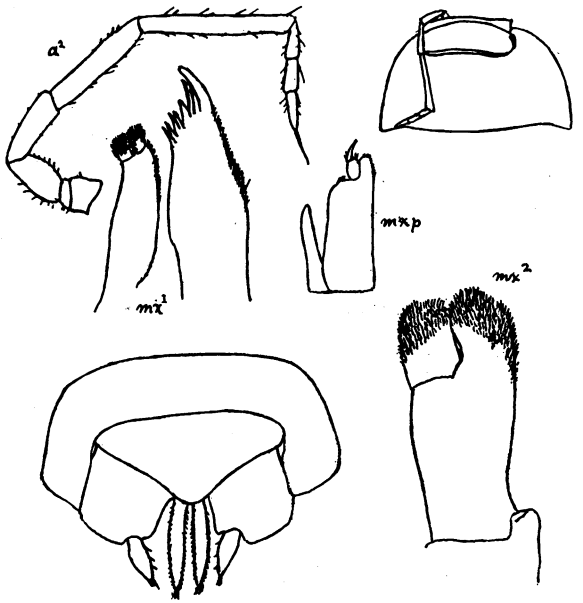

Fig. 177. *Sphaeroniscus columbiensis* Pearse. Adapted from Pearse, 1915.

arranged in irregular anastomosing lines. Head set in first thoracic segment; front nearly straight; epistoma rhomboidal. Eyes small. Flagellum of second antenna 3-segmented. Inner lobe of first maxilli-

ped armed with two plumose processes. First thoracic segment twice as long as head and longer than any other segment. Coxopodites not distinct. First abdominal segment with lateral parts concealed; the second without epimera but not concealed; the epimera of the next three segments continuing the general contour of the lateral margin. Telson broadly triangular, twice as broad as long, obtuse, slightly concave on postero-lateral margins. Basal segments of uropoda large, square, with a notch at the median distal angle for the exopodite which extends downward. The internal ramus of the uropoda slender, reaching about as far as outer ramus, longer than basal segment.

"Color brown, with paired lateral areas which contain irregular yellowish white lines.

"Length, 16 mm.; width, 5.8 mm."

LOCALITY.—Under leaves and logs in forest south of Cincinnati Coffee Plantation, Sierra Nevada de Santa Marta, Colombia, 4800 feet elevation, July 12, 1913. Type in University of Michigan Museum; paratype in U. S. National Museum (Pearse).

Sphaeroniscus peruvianus (Budde-Lund), 1885

Scleropactes peruvianus BUDDE-LUND, 1885, p. 241 (orig. descr.).
Sphaeroniscus(?) *peruvianus* BUDDE-LUND, 1904, p. 47.

Described by Budde-Lund as differing from *Scleropactes concinnus* in the following characters:

"Superficies minutissime granulata.

"Epistomatis linea marginalis frontem satis superans, integra.

"Trunci annuli priores margine posteriore utrinque magis sinuato.

"Caudae annulus analis epimeris annuli praeanalis valde convergentibus multo brevior.

"Long. c. 7 mm."

LOCALITY.—Peru.

Described from an imperfect specimen (Budde-Lund, 1885). In his later work (1904), the same author states that this is not a *Scleropactes* but has "affinity to the genus *Sphaeroniscus*." It may have been his intention not to include this species and *S. senex*, to which his remark also applies, in *Sphaeroniscus* itself, but to establish an allied genus to receive them, but as he did not do this I am leaving them in *Sphaeroniscus*.

Sphaeroniscus senex (Budde-Lund), 1893

Scleropactes senex BUDDE-LUND, 1893, p. 128 (orig. descr.).—DOLLFUS, 1893*a*, p. 345.
Sphaeroniscus(?) *senex* BUDDE-LUND, 1904, p. 47.

Described by Budde-Lund as follows:

"Oblong ovalis, valde convexus, delete tuberculatus, nitidissimus.

"Antennae corpore dimidio breviores, hirsutae; flagellum scapi articulo quinto satis brevius; flagelli articuli ad apicem longitudine paulisper crescentes; articulus tertius seta apicali quam ipso articulo paulo breviore.

"Oculi magni, ocelli magni, numerosi, circiter triginta.

"Epistoma medio convexiusculum, margine superiore frontem superante, in medio transverse fronti adpresso et cum hoc concreto, utrinque libero, cavas duas frontales formante.

"Trunci segmenta tria priora margine posteriore utrinque leviter sinuato, segmentum quartum margine posteriore subtransverso, segmenta 5–6–7 medio sinuato; segmentum secundum margine exteriore paulisper incurvo; epimera hujus segmenti tertia parte anteriore articulari in lateribus a parte posteriore segmenti incisura discreta, epimera segmenti quarti perparva, subtriangula; anguli posteriores segmentorum 2–3 rotundati, segmenti quinti rotundate, sexti et septimi subacute recti.

"Caudae segmenta mediocria, epimeris segmentorum 3–4–5 latis, oblique tetragonis; segmentum anale breve, triangulum, duplo latius quam longius, epimeris segmenti praeanalis subparallelis, apicibus leviter convergentibus multo brevius, apice obtuso supra planum.

"Long. 12–13 mm."

LOCALITY.—Merida, Venezuela.

The statement of Budde-Lund regarding the genus of *S. peruvianus* applies to this species also, and therefore I have also included it in *Sphaeroniscus*. See remarks under *peruvianus*.

Sphaeroniscus granulatus Dollfus, 1893

Figure 178

Slaeroniscus granulatus (misprint for *Sphaeroniscus g.* DOLLFUS, 1893*a*, p. 341).

Sphaeroniscus granulatus DOLLFUS, 1893*a*, p. 341 (orig. descr.), 344, 1 text fig.—RICHARDSON, 1912*c*, p. 31.

Dollfus' description in full is as follows:

"Corps convexe, entiérement couvert de petites granulations.

"Cephalon.—Prosépistome présentant une dépression médiane; bord antérieur dépassant à peine le front et formant une ligne sinueuse. Antennes courtes, à fouet tri-articulé, le premier article plus fort et aussi long que les deux derniers réunis. Yeux moyens, formés d'environ 10 ocelles.

"Pereion.—Duplicature inférieure (coxopodite) du premier segment presque nulle.

"Pleon, Telson.—Cinquième somite du pleon à parties pleurales fortement dirigées en arrière et même un peu convergentes postérieurement. Pleotelson très court, triangulaire, à sommet obtus. Uropodes à base très grande, dépassant le pleotelson et les parties pleurales du pleon, se terminant du côté externe par un processus dentiforme; endopodites dépassant grandement le pleotelson; exopodites apicaux, courts, mais plus développés que dans le genre *Armadillo*.

"Couleur.—D'un gris brun, taché de clair.

"Dimensions.—6 × 2 3/4 mill."

Fig. 178. *Sphaeroniscus granulatus* Dollfus. Adapted from Dollfus, 1893*a*.

LOCALITIES.—Colonie Tovar, Venezuela, a place at considerable altitude, type and only specimen (Dollfus). Richardson reports two specimens 5 mm. long from Puerto de los Pobres, on the Cauca River, Colombia, without description, except to remark that the inner branch of the uropoda does not quite reach the outer branch.

Sphaeroniscus gaigei Pearse, 1915

Figure 179

Sphaeroniscus gaigei PEARSE, 1915, p. 546 (orig. descr.), Fig. 7.

Described by Pearse as follows:

"Body oblong, convex, contour rounded posteriorly; contractile into a somewhat flattened ball; length 4.4 mm. width 1.8 mm. Head set in first thoracic segment; front sinuous, with a slight concavity on either side; lateral angles prominent. Eyes small, with 14 facets. Second antenna robust, with 3-segmented flagellum; covered with many minute setae; ultimate segment nearly as long as the two preceding together, terminal seta very long. First maxilla with two plumose processes.

"First segment of thorax not twice as long as head, with two transverse rows of large tubercles; longer than the other segments, each of which has a row of tubercles along its posterior margin. Coxopodites

not distinct. First two abdominal segments without epimera; epimera of succeeding segments continuing contour of body. Terminal segment nearly twice as broad as long, slightly concave on postero-lateral margins; tip rounded. Uropoda with basal segments square but deeply notched on posterior border near median angle; external rami longer than basal segment, inner rami extending to middle of outer.

"Color reddish brown with irregular bilaterally symmetrical markings of yellowish white."

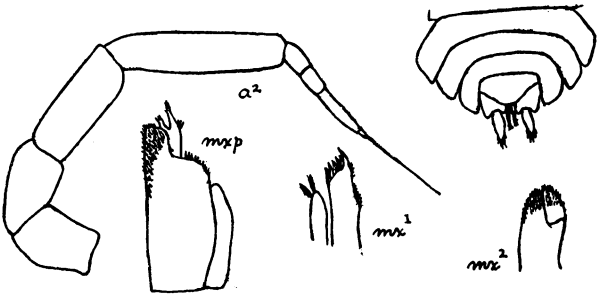

Fig. 179. *Sphaeroniscus gaigei* Pearse. Adapted from Pearse, 1915.

LOCALITY.—Collected in highest timber on San Lorenzo, Sierra Nevada de Santa Marta, Colombia, 7800 feet elevation, under leaves in ground, July 23, 1913. Type in Univ. of Michigan Museum. Paratype in U. S. National Museum (Pearse).

Sphaeroniscus species

Dollfus, 1893*a*, p. 351, mentions a specimen of a new species of this genus in his possession, collected at Loja, Ecuador, but does not name or describe it.

Sphaeroniscus species

Dollfus, 1896*b*, No. 228, p. 2, reports a specimen of *Sphaeroniscus* from Darien, "in too poor condition to be described" (listed also in Van Name, 1926, p. 3).

See also remarks under *Scleropactes zeteki*.

Sphaeroniscus species

Jackson, 1928*a*, p. 588, mentions a few facts about the structure of the head in this genus, basing them on a specimen in the British Museum among Budde-Lund's material, which he said was labeled "*S. intrusus* B.-L.," but of which no description had been published.

He gives no figure and mentions no locality for it, and the name *intrusus* does not seem to me to require recognition as a valid one.

CIRCONISCUS PEARSE, 1917

In this genus the general form of the body is much as in *Cubaris*. The most characteristic feature of the genus is seen in the lateral regions of the first thoracic segment. Throughout most of its length the lateral margin has a narrow outwardly projecting border, but this ends rather abruptly short of the rear angle, its termination being marked by a distinct notch in the lower margin, posterior to which is a rounded lobe, without projecting border, that forms the rear angle of the segment, and likewise constitutes the outer lamella of a narrow cleft for the reception of the anterior edge of the second segment when the body is rolled up. The antennal flagellum consists of two articles. The telson is broadly triangulate and ends short of the general outline of the rear end. The large flat basal segments of the uropoda fill in the spaces each side of it; their inner branches extend posteriorly a little beyond the end of the telson; the short, stout outer branches are inserted in the inner distal angles of the basal segments. Type: *C. gaigei* Pearse. *Paracubaris* Collinge, 1918, is a synonym.

Arcangeli, 1931, states that in *C. bezzii* the tracheae are confined chiefly to the first, second, and third pleopoda, and this I can confirm from an examination of a specimen of *C. gaigei*. I was not, however, able to assure myself from the material I examined that he was justified in stating that the tracheal system in this genus is of the *Tracheoniscus* type, as I was unable to trace the air tubes (which are radially arranged as in his figures) all the way to the margin of the plate, or to find there the pores by which they would open were the structure actually as in *Tracheoniscus*. The question should be further investigated, as, if Arcangeli is correct, the true relationships of *Circoniscus* may be rather with *Tracheoniscus* (through such genera as *Cylisticus*) rather than with *Cubaris*.

Circoniscus gaigei Pearse, 1917

Figures 180, 181

Circoniscus gaigei PEARSE, 1917, p. 4 (orig. descr.), Fig. 2.—VAN NAME, 1925, p. 488 (new descr.), Figs. 43–51.—ARCANGELI, 1927*a*, pp. 135–137; 1931, p. 118.

The following statements are taken from Van Name, 1925, pp. 489, 490:

"Body surface very smooth and even. No tuberculation, the surface is very thickly dotted with minute, scabrous punctae bearing very

short minute hairs or setae. On the antennae, legs, etc., there is a coarser and more conspicuous pubescence. Legs rather weak and slender, with rather weak but moderately numerous spines.

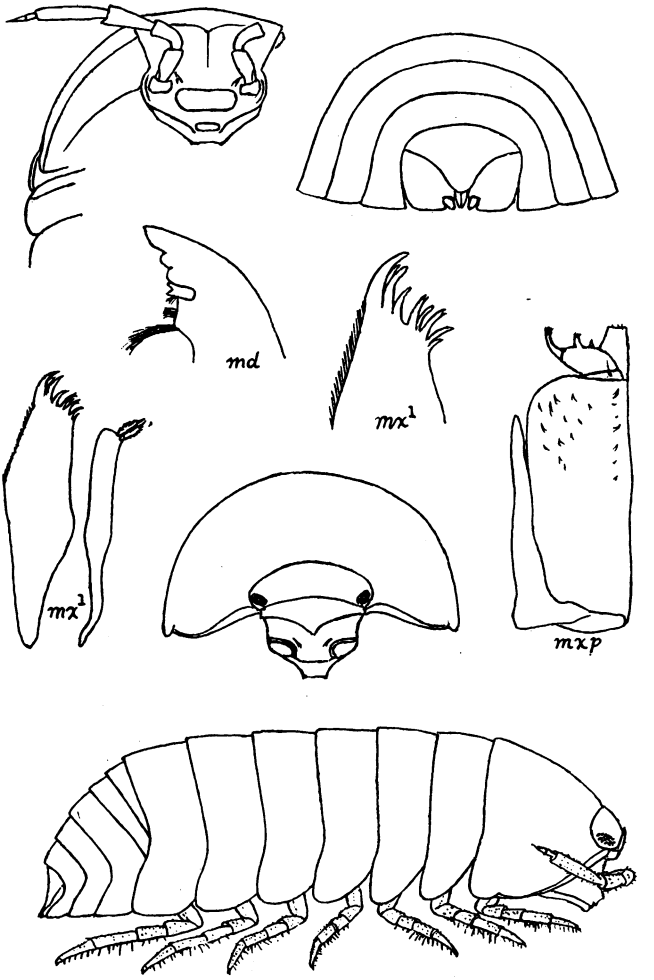

Fig. 180. *Circoniscus gaigei* Pearse. From Van Name, 1925, Zoologica, VI, p. 489.

"Head rather narrow, forehead low, upper edge of the epistome arched, forming a projecting upturned border distinct all the way across the head. First antennae minute, composed of three segments, the sec-

ond the shortest, the terminal one much more slender than the others. Second antennae short and small, conspicuously and stiffly pubescent, the flagellum of two very small short articles which together are less than one-third the length of the last segment of the peduncle and of much smaller diameter than the latter. The terminal article bears a rather large moveable terminal bristle. The mouth parts form a very prominently projecting mass. Mandible with a row of four small tufts of hairs ('penicili') on the inner aspect distal to the large brush-like tuft. Eyes rather small, ocelli fairly numerous, apparently at least twenty-five in the largest specimens, but not well defined or well pigmented.

"First segment of the thorax rather large and wide, the anterior part of the lateral border narrowly rolled outward to form a rather thin projecting border. This diminishes toward the rear and disappears

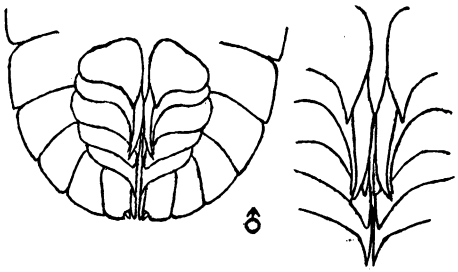

Fig. 181. *Circoniscus gaigei* Pearse. Male. Ventral view of abdomen.

a little way from the rear corner where the rear part of the lateral face of the segment extends down vertically into a small semicircular lobe that forms the posterior lateral corner of the segment. In a ventral view it can be seen that this lobe forms the outer and longer side of a very small V-shaped notch for the reception of the second segment when the body is tightly rolled up. The inner side of the notch is very short and much thicker. The border of the segment is not sulcated. The inner side of the second segment has the anterior edge thickened but no process."

See also remarks on the tracheae of the pleopoda under the genus *Circoniscus*.

Color (in alcohol) varying from rather dark grayish brown to pale brown with numerous very small, somewhat irregular, yellow markings on the forehead and lateral parts of the back and yellow borders on the segments. Under parts and limbs yellow.

Length of largest specimens (males) nearly 20 mm.

LOCALITIES.—Dunoon, British Guiana (type locality), from rotten logs, aerial rootlets, loose bark of trees, and dry sand (Pearse); Kartabo, British Guiana, from dead wood (Van Name). Cotypes in Museum of University of Michigan (Pearse). Specimens from Kartabo, in the American Museum of Natural History, are the basis of the description and figures here reproduced.

Circoniscus hamatus, new species

Figure 182

A much smaller species than *C. gaigei*, if we may judge by the material available, but so like it that without a close examination it might be taken for the young of that species.

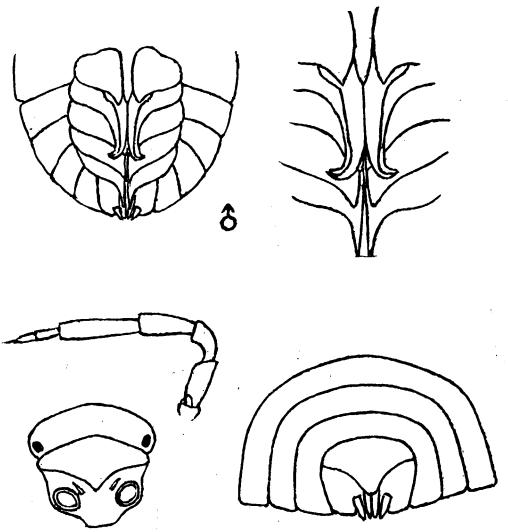

Fig. 182. *Circoniscus hamatus*, new species.

As in that species, the integument is very hard and smooth and the articulation firm and compact. The body is, however, proportionately a little narrower and the ends of the abdominal segments are scarcely at all bent or flared outward. The lateral border of the first thoracic segment is also less rolled outward.

Upper border of epistome less evenly curved, its outline being more that of a very obtuse triangle. Second antennae larger (both longer and stouter), with a proportionately longer flagellum, the latter, exclusive of its terminal spine, being about half the length of the fifth segment of the peduncle.

The backwardly extended processes of the inner and outer divisions of the second pleopoda of the male are larger and stouter, and instead of being only slightly

curved outward at the tips are so strongly bent as to be properly termed hooked. The exposed part of the uropoda is narrower and the outer branch is narrower and longer and is inserted about at the level of the tip of the telson, instead of at a point noticeably beyond the latter.

The color pattern is similar to that of *C. gaigei* but the markings are more conspicuous owing to the blackish slate ground color of the upper parts.

The largest specimens, could they be straightened out, would hardly measure 10 mm. in length.

LOCALITY.—Kamakusa, British Guiana. Eight specimens, including both sexes, obtained by Mr. Herbert Lang, October 25, 1922, are in the American Museum of Natural History. They include the type (a male, Cat. No. 6521).

Circoniscus spinosus (Collinge), 1918

Figure 183

Circoniscus spinosus VAN NAME, 1925, pp. 466, 491.

Paracubaris spinosus COLLINGE, 1917, p. 62 (orig. descr.), Pl. VI.—ARCANGELI, 1927*a*, pp. 136, 137; 1931, p. 118.

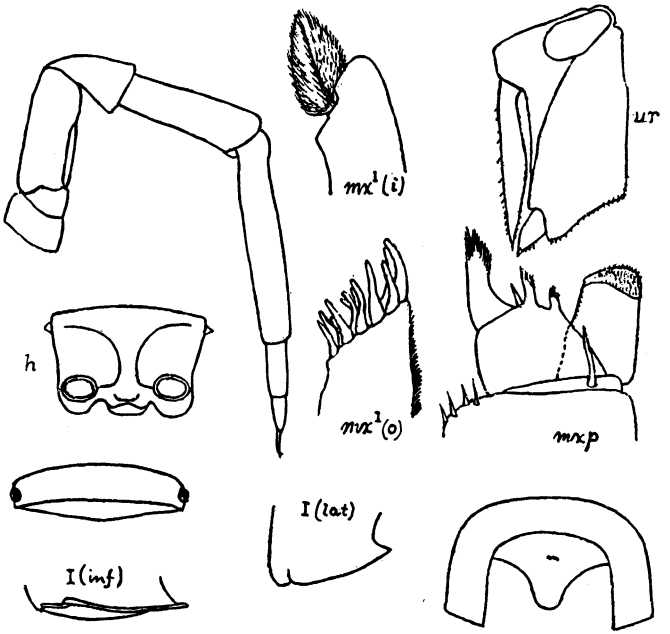

Fig. 183. *Circoniscus spinosus* (Collinge). Adapted from Collinge, 1918.

The following statements are taken from Collinge's description:

"Body oblong-oval, segments strongly convex, dorsal surface covered with short, blunt spines, finely granulose. Cephalon short and wide, with well marked anterior and posterior margins; cephalic lobes absent; epistome dorsally sloping from the anterior margin of the cephalon, keeled in the median line, concave laterally. Eyes compound, situated dorso-laterally. . . .

"The segments of the mesosome are strongly convex, pleural plates all slightly excavate, those of the 2nd to 5th segments terminally bluntly pointed, remainder truncate, posterior angles undeveloped. The first segment has a slight fold on the outer margin, which ventrally appears as a thickening. Thoracic appendages normal, enlarging slightly posteriorly. Uropoda extending beyond the telson; basal plate thick and flattened, with a slightly raised diagonal crest, exopodite short and broad, articulating with posterior inner border and extending beyond basal plate a little, endopodite long, both spinous and with small terminal styles. Telson triangular, terminally bluntly pointed, proximally wider than the length.

"Length, 20.5 mm.

"Color (in alcohol) greenish brown with lateral areas on the mesosome of brown and white mottling."

LOCALITY.—Mazakuvi River, British Guiana, in decaying wood. Two specimens taken by G. E. Bodkin, May, 1916.

The suggestion of Arcangeli, 1927, that this species is identical with *Circoniscus gaigei* Pearse, cannot easily be satisfactorily reconciled with the statement of Collinge that the back is "covered with short blunt spines" in the present species. *C. gaigei* is a very smooth species, its minute scattered setae being visible only on magnification.

Circoniscus bezzii Arcangeli, 1931

Figure 184

Circoniscus bezzii ARCANGELI, 1931, p. 115 (orig. descr.), Pl. II.

I find it very difficult, either from Arcangeli's description or figures, to find any well-marked characters distinguishing this species from *C. gaigei* described above, except that the second segment is said to have a coxopodite process in the form of a "rounded tooth" on the inner aspect of the epimera, and the third segment to have one still more reduced. Such a statement could hardly be made of my specimens of *gaigei*, the margin is merely thickened and folded over. I find also that the posterior

margin of all the thoracic segments show at least a little backward flexion in *gaigei*, as is shown in the side view of the body of that species, while it is said to be straight in the segments to and including number IV in *bezzii*.

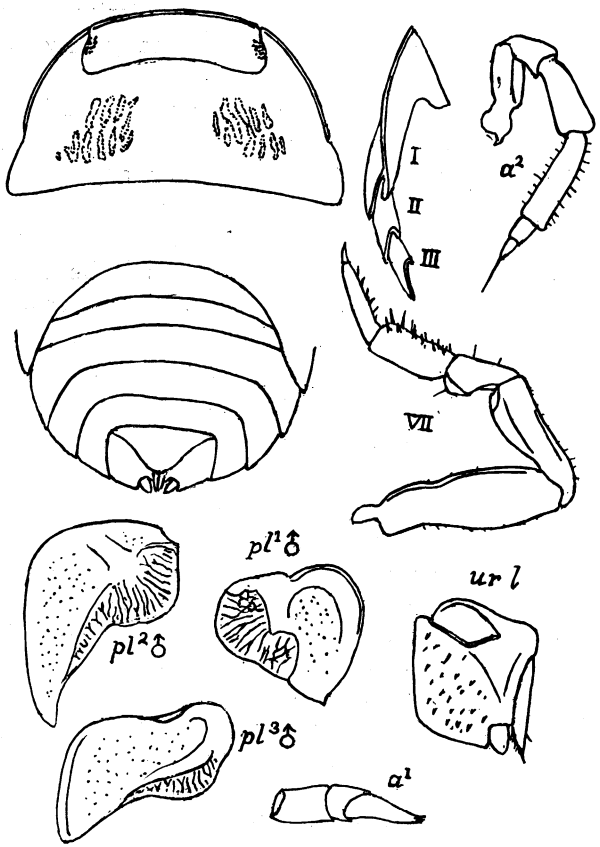

Fig. 184. *Circoniscus bezzii* Arcangeli. Adapted from Arcangeli, 1931.

Length, 11 mm.; width, 5.5 mm.

LOCALITY.—"Carandasinho, Brazil," a place I have not located on the map. Two males and two females collected by Dr. M. Borelli.

See remarks on the respiratory apparatus of the species under the genus *Circoniscus*.

COXOPODIAS RICHARDSON, 1910

Coxopodias was established as a genus by Richardson, 1910*a*, p. 93, for a new species from Costa Rica related to *Cubaris*, characterized by

having distinct coxopodite ridges or processes on the under side of the first, second, and third thoracic segments, in having the outer branch of the uropoda (which is minute) inserted on the dorsal surface of the basal segment about in the middle of the exposed part, the antennal flagellum two-jointed, and the telson pointed at the end. *Minca* Pearse, 1915, is a synonym.

Arcangeli, 1927 and 1930, states that there do not seem to be any characters of generic importance separating *Coxopodias* from *Synarmadillo* Dollfus, 1892, an African genus. It is, however, distinguished by the central insertion of the outer branch of the uropoda above noted, and possibly by other characters, so that for the present I am retaining it as a genus.

Coxopodias tristani Richardson, 1910

Figure 185

Coxopodias tristani Richardson, 1910*a*, p. 94 (orig. descr.), Figs. 1–4.—Picado 1913, p. 337.—Arcangeli, 1927*a*, p. 138; 1930*a*, pp. 2, 11.

The following statements are taken from Richardson's description: "Head wider than long, the eyes small, composite, situated close to the lateral margin: anterior margin straight, the antero-lateral angles

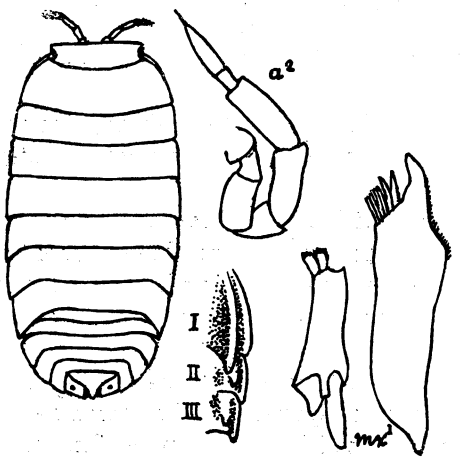

Fig. 185. *Coxopodias tristani* Richardson. Adapted from Richardson, 1910*a*.

acute; front not margined. Flagellum of second antennae composed of two articles, the first of which is about half as long as the second.

"Body ovate, very convex; surface smooth. Epimeron or coxo-

podite of first thoracic segment extends the entire length of the lateral margin, separated from the segment by a longitudinal furrow; it is cleft posteriorly. There is also a slight furrow on the dorsal side of the segment, close to the lateral margin. The second and third segments of the thorax are also furnished on the underside with small but conspicuous coxopodites in the form of tooth-like processes.

"Sixth or terminal segment of the abdomen triangular with the apex produced in an acute process. Basal article of the uropoda obliquely triangular, occupying all the space between the sixth abdominal segment and the lateral parts of the fifth segment. Inner branch of the uropoda extends to the tip of the inner postero-lateral angle of the basal angle; outer branch minute, situated about the middle of the dorsal surface of the basal article.

"Color reddish brown, with a lateral band of light wavy lines on either side of the body. Dimensions not given."

LOCALITIES.—Costa Rica. Type from road between Juan Vinas and Reventazon; other specimens from Turrialba. Type in U. S. National Museum (Richardson). San José (Arcangeli).

This species is listed by Picado as occurring both in bromeliads and on the ground.

Coxopodias ruthveni (Pearse), 1915

Figure 186

Minca ruthveni PEARSE, 1915, p. 546 (orig. descr.), Fig. 6.—ARCANGELI, 1927*a*, p. 138.

The following details are from Pearse's description:

"Body finely tuberculate, pubescent toward posterior end; length 16 mm., width 7.4 mm.

"Eyes small oval, with about 12 facets.

"Coxopodites distinct on the first three segments; on the first in the form of a long carina extending the whole length of the segment, but diverging more posteriorly; on the second and third as small triangular processes.

"Color.—Chocolate brown with median spots and lateral yellowish white markings; often the epimera on the thorax have white spots."

DISTRIBUTION.—Santa Marta, Colombia (Cincinnati Coffee Plantation at 4500 feet altitude, abundant under logs; type locality). Type in University of Michigan Museum.

Arcangeli, 1927, p. 139, points out that *Minca* Pearse, 1915, is not distinguishable from *Coxopodias* Richardson, 1910.

See remarks under that genus.

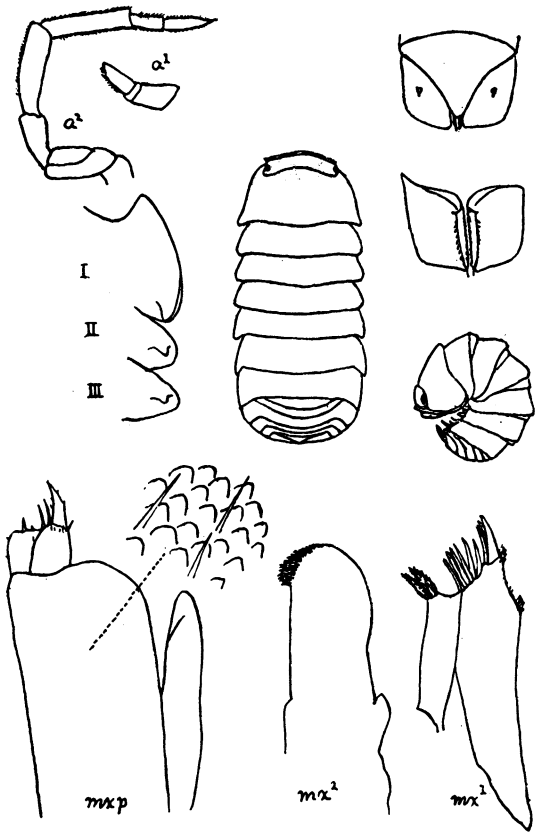

Fig. 186. *Coxopodias ruthveni* (Pearse). Adapted from Pearse, 1915.

HAPLARMADILLO DOLLFUS, 1896

This was established by Dollfus, 1896, p. 399, as a genus to contain the following species only, described as new in the same article. That author states that it is nearly related to the Old World genus *Synarmadillo* Dollfus, 1892, but differs in the monocellated eyes and single-jointed antennal flagellum.

Haplarmadillo monocellatus Dollfus, 1896

Figure 187

Haplarmadillo monocellatus DOLLFUS, 1896, p. 400 (orig. descr.), Figs. 13*a*–13*d*.—RICHARDSON, 1910, p. 573; 1905, p. 665 (orig. descr. quoted), Fig. 705.—OMER-COOPER, 1926, p. 352.—ARCANGELI, 1927*a*, p. 133.

The original description is as follows:

"Body convex, smooth, and covered with minute, setose hair.

"Cephalon.—Prosepistoma with a shield-like convexity. Eyes monocellate, hardly perceivable. Antennae very hairy; flagellum single-jointed with a long stiff hair at its distal end.

"Pereion.—First segment with a very blunt anteromedian tubercle; hind edge nearly straight; sides feebly raised forward; coxopodite distinct on the posterior half of the edge. Second segment with no distinct coxopodite.

"Pleon, Telson.—Pleotelson widely triangular, much wider than long. Uropoda with a square basis; longer than the pleotelson; endopodite as long as the basis; exopodite minute, placed at the internal distal angle of the basis.

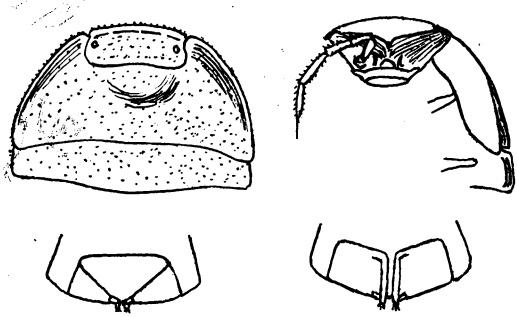

Fig. 187. *Haplarmadillo monocellatus* Dollfus. Adapted from Dollfus, 1896.

"Color.—Dark gray; variegated with lighter lineolae and irregular stripes.

"Dimensions.—9 by 4 mm."

LOCALITY.—"St. Vincent, Richmond valley under rotting leaves, 1100 feet, January 18 (one example)." Type in British Museum (Dollfus).

GLOBARMADILLO RICHARDSON, 1910

A genus established by Richardson (1910, p. 495) for the new species *G. armatus* whose description is quoted below. Among the characters given are:

"Thorax with no epimera distinctly separated from the segments either above or below.

"Abdomen with the terminal segment triangular ending posteriorly in an acute point.

"Uropoda with the basal article or peduncle wider than long, situated somewhat obliquely; the inner branch is inserted at the inner post-lateral angle of the basal article; the outer branch is short, hidden in a dorsal view, and does not reach the tip of the terminal abdominal segment."

Globarmadillo armatus Richardson, 1910

Figure 188

Globarmadillo armatus RICHARDSON, 1910, p. 495 (orig. descr.) 1 text fig.—ARCANGELI, 1927*a*, p. 134.

The following statements are taken from the original description:

"Head broader than long, with the front slightly excavate and the lateral angles acutely produced. Flagellum (of antennae) consists of

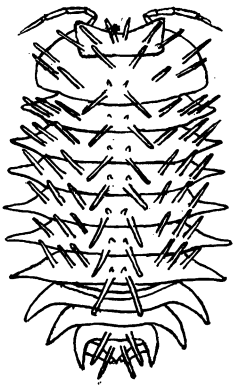

Fig. 188. *Globarmadillo armatus* Richardson. Adapted from Richardson, 1910.

two articles the first of which is minute, the second long and tapering and furnished with a long spine at the tip. The lateral parts of the first segment (of the thorax) are produced anteriorly and posteriorly into a broad plate on either side. The lateral parts of all six (following) segments are produced into long narrow spine-like processes. Epimera are not distinct on any of the segments either on the dorsal or ventral side.

"Lateral parts of the third, fourth and fifth (abdominal) segments are produced in long, narrow tapering processes.

"The two specimens are very small and so completely rolled up that only a diagrammatic drawing could be made."

LOCALITY.—Trece Aquas, Guatemala. Two specimens, including type, in U. S. National Museum (Richardson).

PERISCYPHIS GERSTAECKER, 1873

Closely related to *Cubaris*, but distinguishable by the narrower, more or less tapering telson, often pointed at the end and not constricted at the middle; the absence of a sulcus on the inferior aspect of the border of the first thoracic segment, and of a cleft at its rear angle. This segment, however, has the margin with an abruptly thickened border on the outer side, at least on the anterior part, which becomes narrower and disappears toward the rear end of the segment (see Omer-Cooper, 1926, p. 355).

Periscyphis species

Kraepelin, 1901, p. 204, reports a specimen of this genus brought to Hamburg, Germany, on orchids from San Francisco, Brazil. The genus was determined by Budde-Lund, according to Kraepelin, but Budde-Lund, 1908*a*, p. 278, states that the known species of the genus are all from Africa. The American origin of the specimen must be considered extremely doubtful.

PSEUDARMADILLO SAUSSURE, 1857

This genus was established by Saussure on the basis of a single specimen which he named *P. carinulatus* and which was of uncertain locality: "Mexico or Cuba." Probably Cuba was correct, for while numerous specimens of the genus have since been collected in Cuba, the Isle of Pines, and the Bahamas, none, so far as I am aware, has been found in Mexico. Five species of the genus have been described, which differ mainly in the tuberculation or spination of the dorsal surface, a character which seems to be subject to a great deal of individual variation.

So far as the more fundamental characters are concerned, a single description will suffice for all of them. In general form the body resembles that of *Cubaris* and is capable of being rolled up into a ball, but the front outline of the head (formed by the upper border of the epistome) presents, when seen from above, three broad lobes, a median and a lateral on each side. In a front view, the outline of the epistome is straight and horizontal in the middle, rising a little on each side and dipping down again under the eyes, which are small, with very few ocelli and often imperfectly pigmented. Antennae short and stout with a flagellum of two joints, the first very short.

The lateral margin of thoracic segment I and the epimera of abdominal segments 3, 4, 5, as well as the terminal end of the telson are bent or flared outward.

Segment I of the thorax has a coxopodite ridge on each side throughout the whole length of the under side of the segment. It is separated from the margin by a broad, deep sulcus ending behind, as in *Cubaris*, in a cleft, the inner side of which is formed by a small plate-like continuation of the coxopodite ridge which is often somewhat notched or emarginate at the end, though I have never seen a case that could without exaggeration be called "bifurcate," as Richardson describes it. Whether this small character is really of diagnostic importance I do not know. Segment II has a large, acute, posteriorly directed coxopodite process. Segment III merely has the anterior edge folded, but beginning with the fifth, the following segments have a small but more or less distinct tooth-like process.

The dorsal surface of the abdomen has a steep roof-like slope which often is accentuated by a row of large median tubercles.

Segments 4 and 5, and to a less extent 3, bear inwardly extending plates arising from the ventral or inner surface of the epimera. The edges of the outer plates of the corresponding abdominal pleopoda fit closely against the free ends of these plates and against ridges on the upper ventral ends of the basal joints of the uropoda in such a way as to quite effectively close in and protect from drying the respiratory (inner) plates of the pleopoda.

The telson differs from that of *Cubaris* in being of somewhat triangular form, truncate at the narrow rear end. The basal joints of the uropoda fill in the spaces on each side of it, and have the very small, short external branch inserted in a notch in the inner rear angle, visible both in a dorsal and in a ventral view, while the internal branches are inserted close together as in *Cubaris* and are visible only from below, not quite reaching the end of the telson. They differ from those of *Cubaris* in being narrow at the inserted end and becoming wide and truncated at the distal end, which bears numerous very short setae.

The dorsal surface of the body bears numerous small tubercles arranged in more or less distinct transverse rows, a row near the rear edge of each thoracic segment being especially regular. In addition, there are certain larger tubercles, some of which may become long spines or processes in some species. There is a transverse row of four large ones near the upper (posterior) border of the head, a longitudinal row, not always conspicuous, on the side of the thorax about halfway from the median line to the lateral ends of the segments, a pair in the rear border of segment VII, and a median row on abdominal segments 3 (perhaps not always), 4, 5, and on the proximal part of the telson. Below the

median tubercle on the telson is a pair of smaller ones with a median depression between them.

Pseudarmadillo carinulatus Saussure, 1857

Figures 189, 190

Pseudarmadillo carinulatus SAUSSURE, 1857, p. 307 (brief descr.); 1858, p. 483 (redescribed), Pl. v, figs. 43, 43*a*.—STUXBERG, 1875, pp. 46, 63.—BUDDE-LUND, 1879, p. 7; 1885, p. 41 (new description: type examined).—STEBBING, 1893, p. 434.—DOLLFUS, 1896*d*, XXI, p. 46.—RICHARDSON, 1901, p. 572; 1902*a*, p. 511; 1905, p. 657 (Saussure's description quoted and translated), p. 659, Fig. 702 (after Saussure).—BOONE, 1934, p. 574 (new descr.), Fig. 4.

The following details are taken from the generic diagnosis and description of the species in Budde-Lund, 1885.

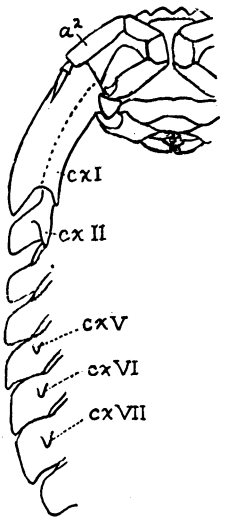

Fig. 189. *Pseudarmadillo carinulatus* Saussure, 1857. From specimens from Guantanamo, Cuba.

"Oblonge ovalis, convexus, granulatus vel tuberculatus; caput post crista tuberculorum maxime quattuor majorum; trunci annulus septimus medio duobus tuberculis et caudae annuli 4–5–6 medio tuberculis singulis, omnibus majoribus ornatus.

"Epistoma margine superiore marginem frontalem satis superante; incisuris duabus margo trilobatus videtur.

"Clypeus brevis, perpendicularis, margine superiore submarginato, non lobatus. Oculi congregati, parvi: ocelli circiter 6, non pigmentati, subdistantes. Trunci annulis primus margine laterali crasso, sulcato,

post parum profunde fisso; parte exteriore altecincta, revoluta tenui; parte inferiore breviore. Trunci annuli duo priores epimeris post fissis.

"Caudae annulis analis trapezoideus, subtrigonus, lateribus ad apicem subsinuatis, apice truncato, supra valde convexus.

"Color albidus uniformis.

"Long. 10 mm."

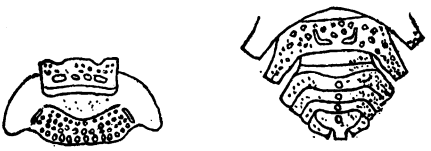

Fig. 190. *Pseudarmadillo carinulatus* Saussure. Adapted from Saussure, 1857.

Localities.—Type locality doubtful, reported as from "Mexico or Cuba." It was probably from Cuba (see remarks under the genus). Boone, 1934, reports it from Guaso, near Guantanamo, Cuba. Her specimens do not have the end of the coxopodite ridge of segment I emarginate, but narrow and rounded.

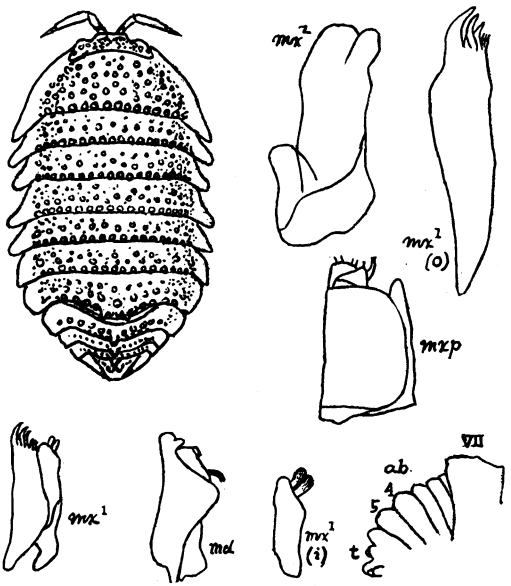

Fig. 191. *Pseudarmadillo dollfusi* Richardson. Adapted from Richardson, 1905.